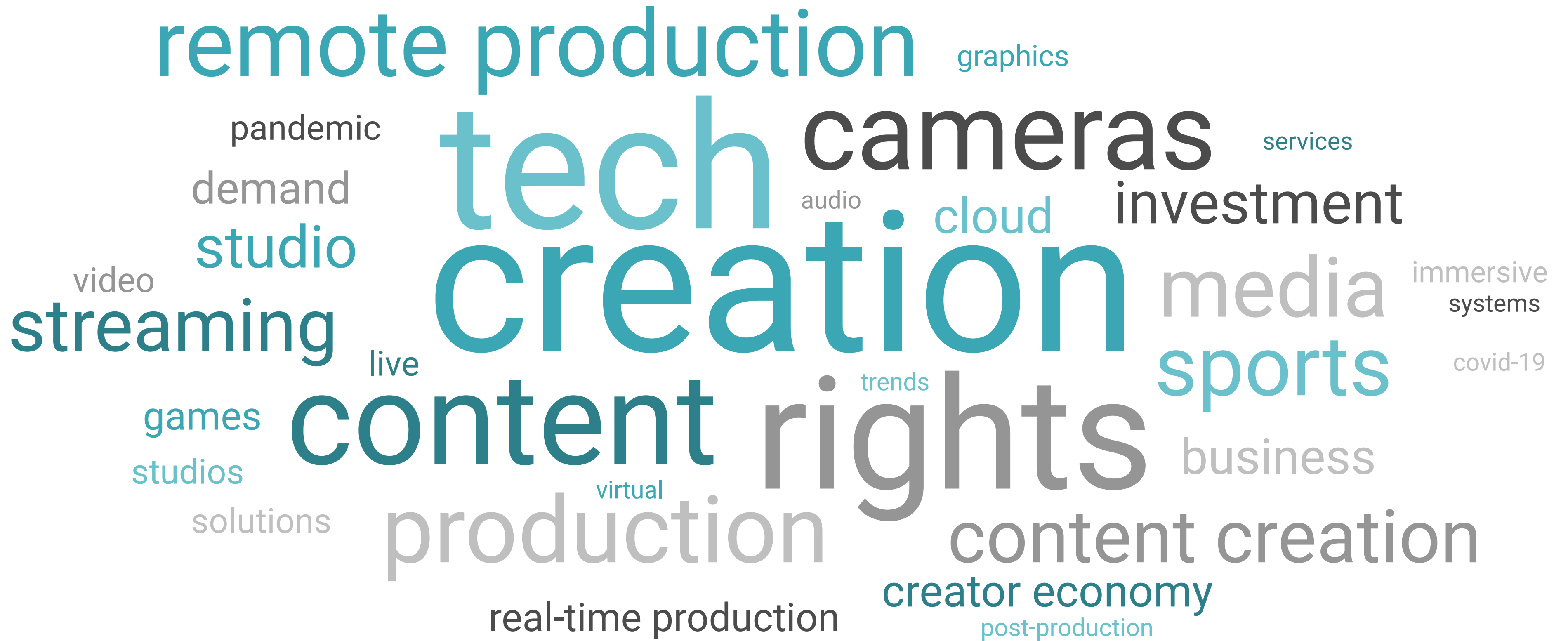


# Content Chain Trends

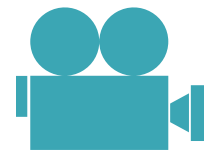
## Content Creation & Production

# Contents



# Contents

 Click on the icons below to go to specific parts of this report.  
 Use the purple icon on the top-right of every page to return to this table of contents.



## State of Content Creation & Production

- ☐ Macro Trends
- ☐ Key Drivers
- ☐ Investment in Create & Produce
- ☐ Non-live Content
- ☐ Live Content



## Content Creation Tech

- ☐ Cameras
- ☐ Camcorders
- ☐ Camera Accessories
- ☐ Lighting
- ☐ Microphones



## Business and Tech Trends

- ☐ Direct-to-Consumer
- ☐ Creator Economy
- ☐ Cloud & Remote
- ☐ Imaging & Immersive

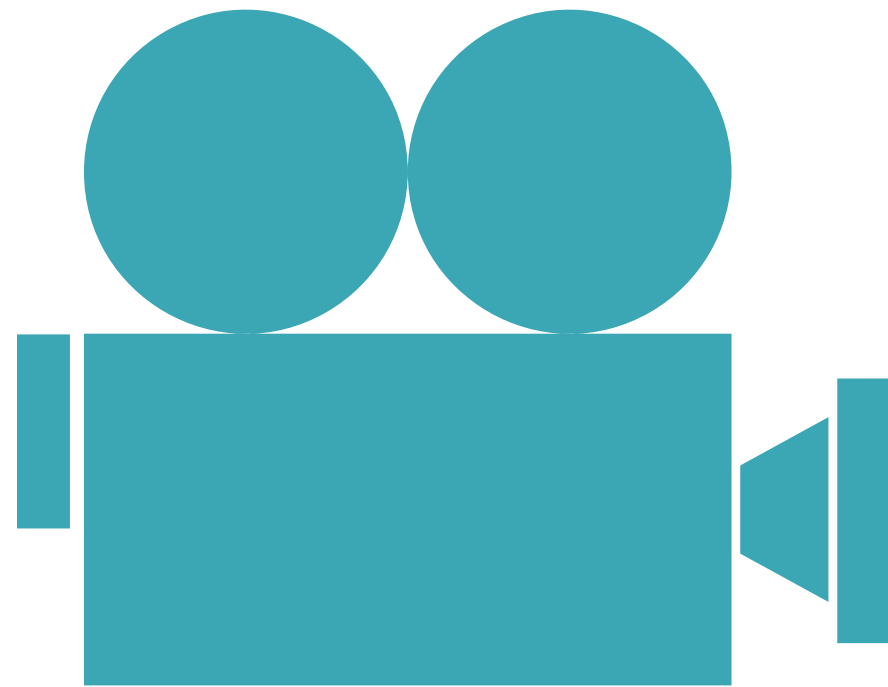


## Content Production Tech

- ☐ Real-time Production
- ☐ Manage Production
- ☐ Post-Production

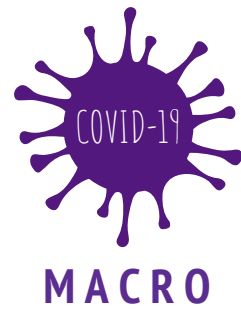


# State of Content Creation & Production



# State of Content Creation and Production

## Macro Trends



The global shortage of semiconductors deteriorated again in the second half of 2021, causing a decline in creation and production tech supply and revenues.



The cost of key components continued to soar due to the supply chain disruption, forcing many suppliers to pass the cost increase onto their customers.



Major revenue drivers like sports events and studio productions made a comeback in 2021, boosting investment in original content and remote production.



The rapid growth of the "creator economy" continued in 2021, representing untapped market potential for many media tech suppliers.



The pandemic accelerated media businesses' move to the cloud and remote production, dictating their investment in IP and cloud-native media tech.



Increasing demand for high-end content and interactivity is driving investment in VR/AR capabilities.

Sources: IABM

# State of Content Creation and Production

## Key Drivers



### Cloud



Efficiency and agility

Productivity ("more with less")

Collaboration

### Remote Production



Crew consolidation

Decentralization of production

IP connectivity & remote control

### Creator Economy

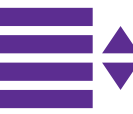


Technology democratization

Alternative programming source

B2C tech supply

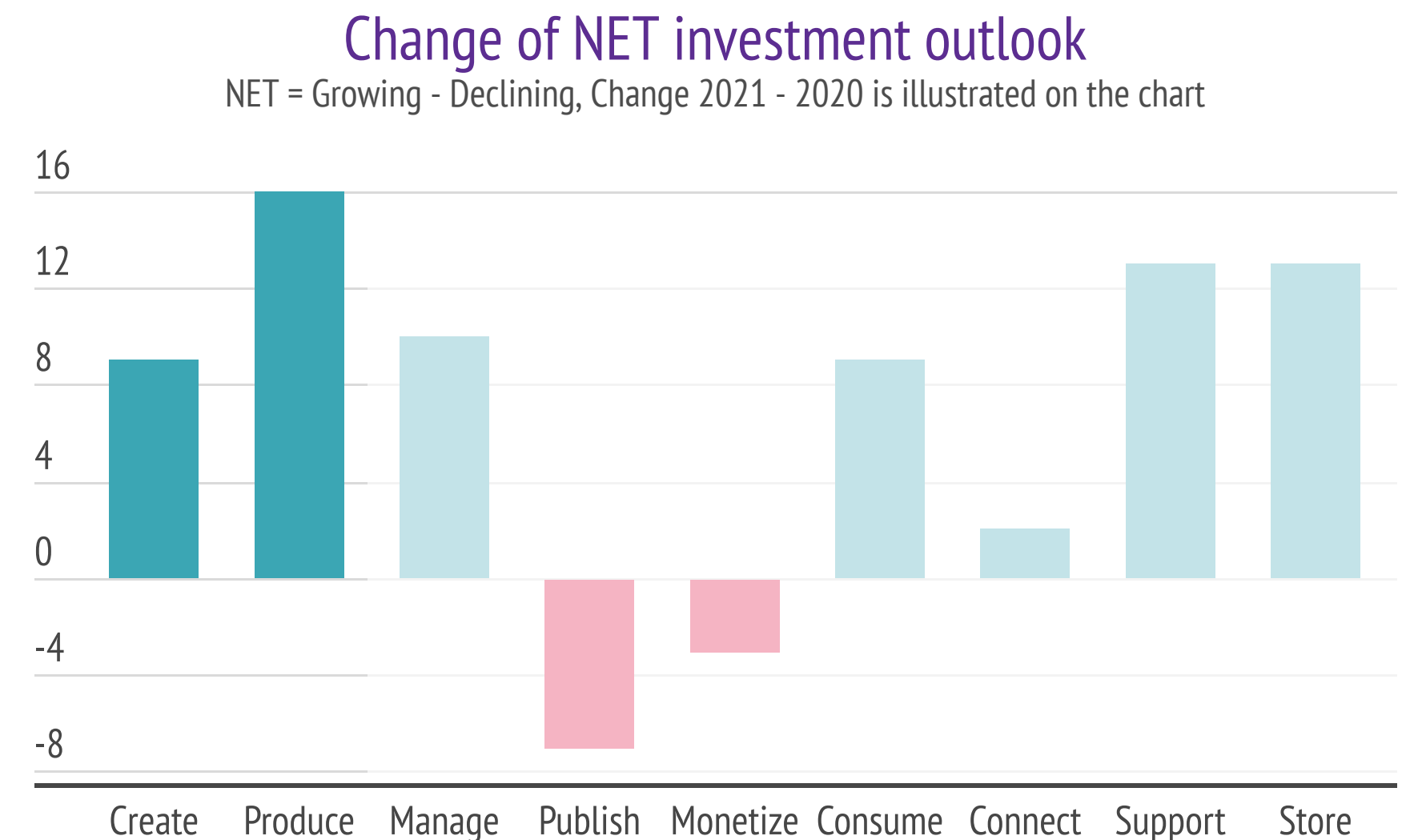
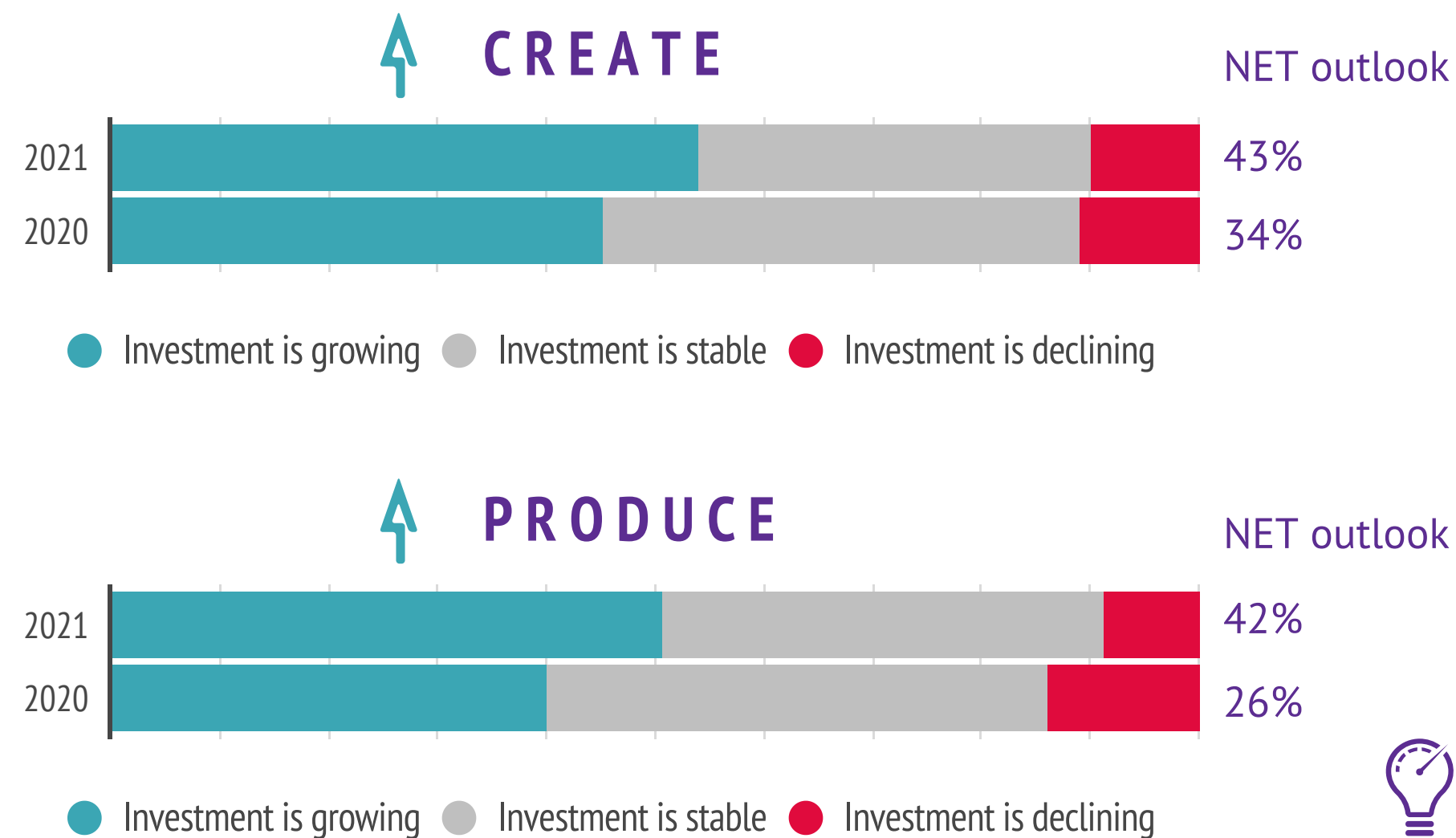
Sources: IABM



# State of Content Creation and Production

## Investment in Create and Produce

Regardless of the ongoing semiconductor shortage, the investment outlook in content creation and production among industry players has improved over 2021 compared with 2020, as live sports and studio productions made a comeback amid countries lifting COVID-related restrictions. Produce had the most noticeable improvement of the NET investment outlook, equalizing it with Create investment outlook.



Sources: IABM



# State of Content Creation and Production

## Non-live Content - Production Restart

After a dip in 2020, the number of original scripted TV series in the US hit a new record in 2021 thanks to the launch of delayed series from 2020 as well as new streaming services (e.g., HBO Max, Peacock, Paramount+) entering the market.

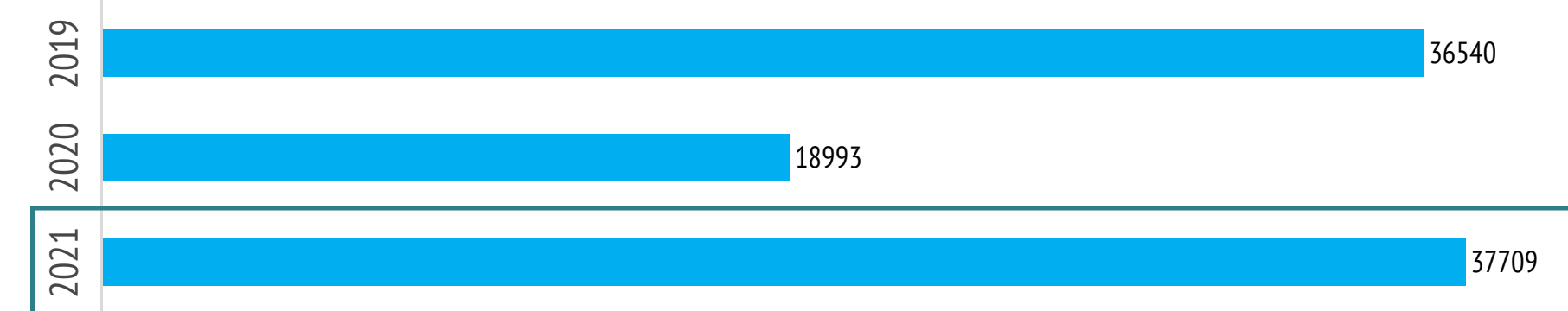
In 2021, on-location shoot days in Los Angeles Area jumped up by nearly 100% YoY after the COVID-19-related production shutdowns ended. However, the on-going Omicron surge is slowing down production projects in Q1/2022.

After the COVID-19 pandemic stalled many productions in 2020, Netflix is again increasing its investment in original content saying that it expects about 50% of its content spending to be on original programming.

### Number of scripted TV series in the US, 2019-2021



### Shoot days in Los Angeles Area, 2019-2021



### Netflix original content investment worldwide



Sources: IABM, FX Networks Research, Variety, FilmLA, Netflix

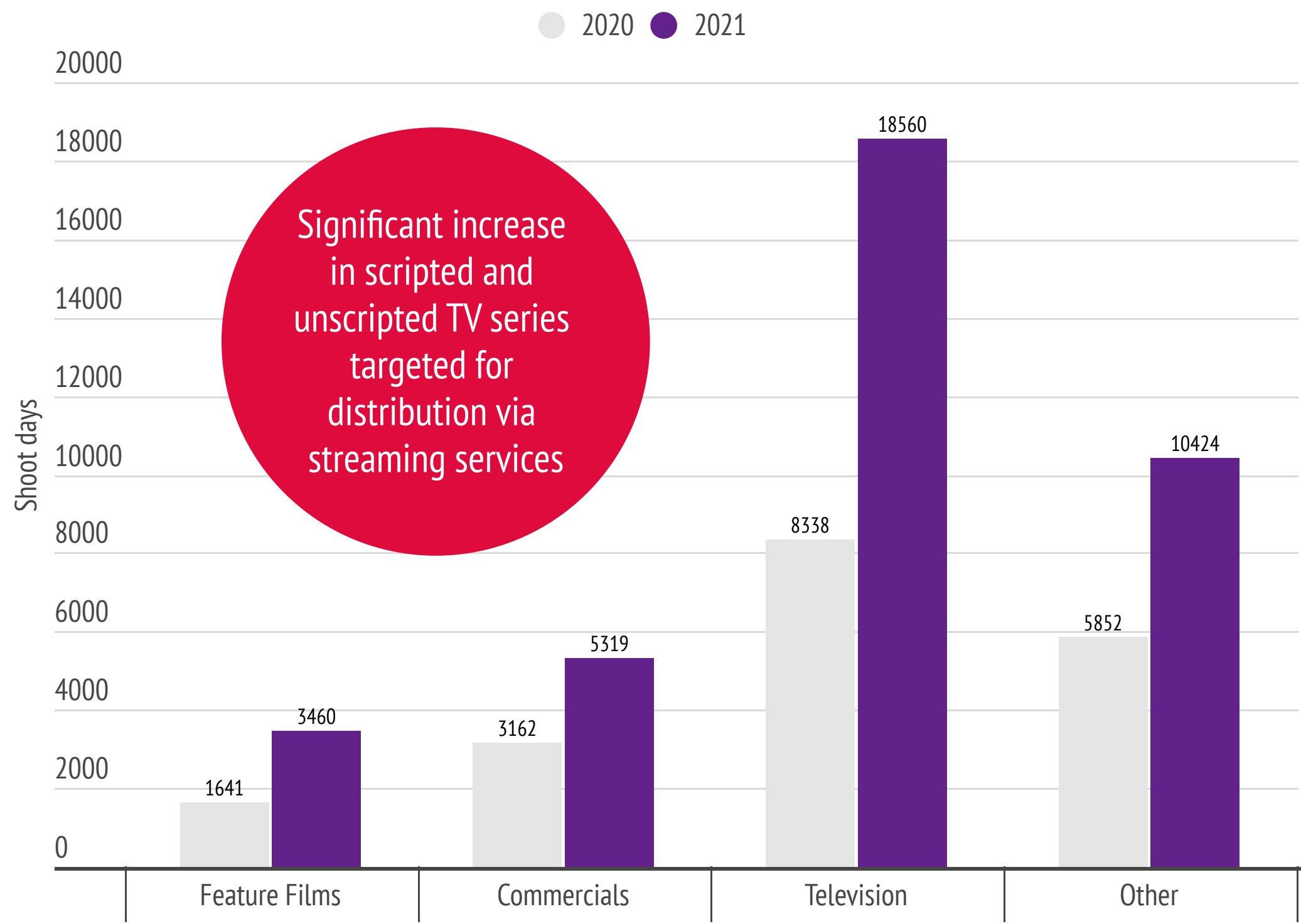


# State of Content Creation and Production

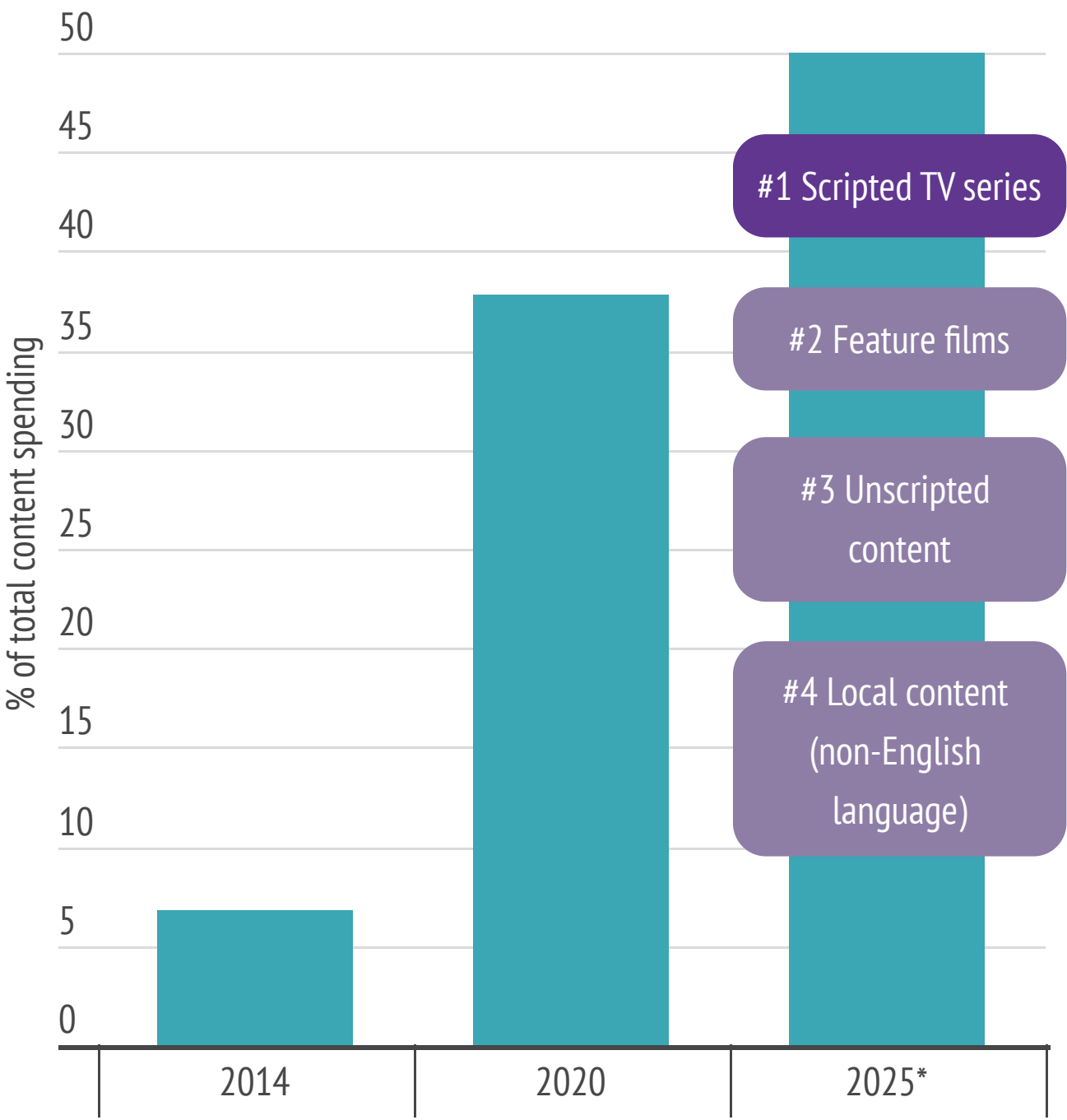
## Non-live Content - Production Restart



Shoot days in Los Angeles Area by Category, 2020-2021



Netflix % of Spending on Original Content



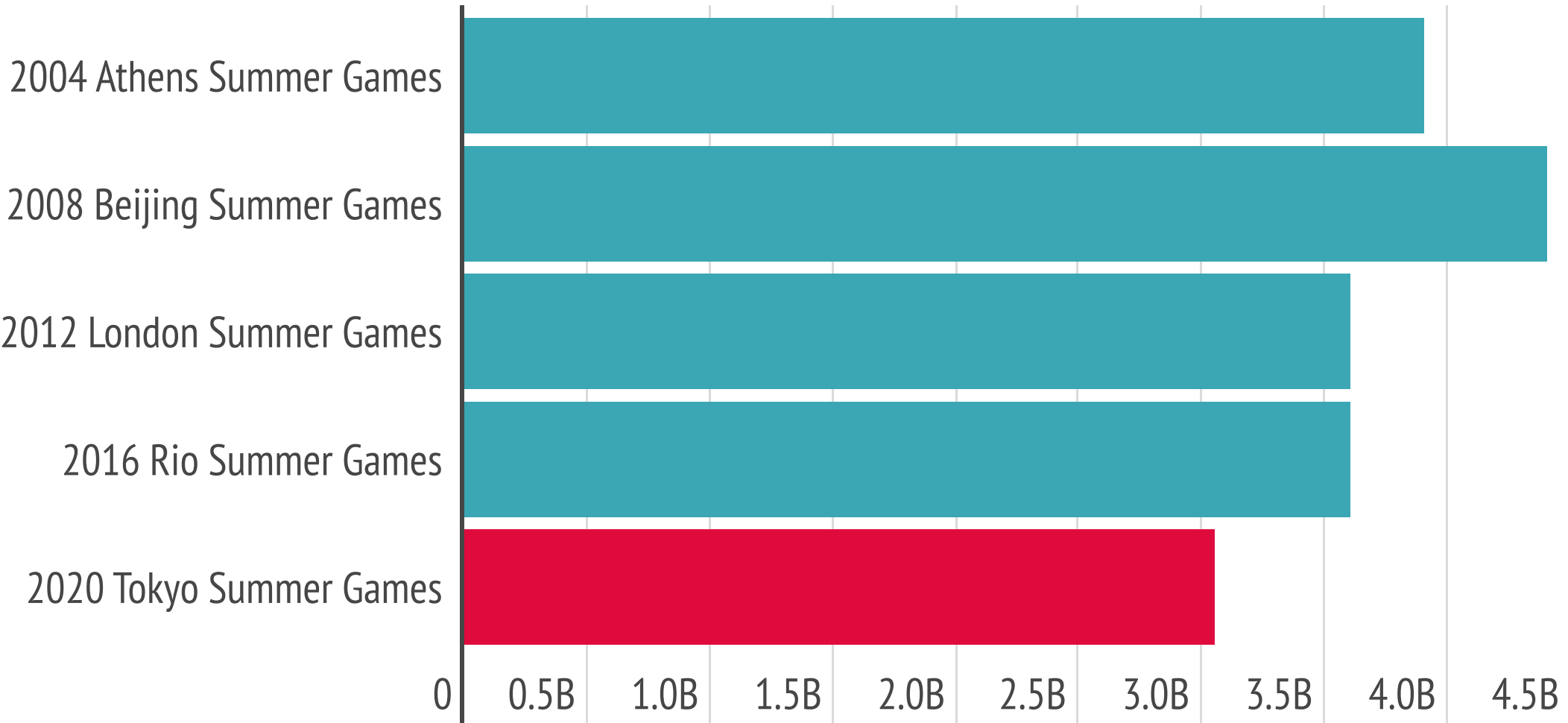
Sources: IABM, Variety, FilmLA, Netflix

# State of Content Creation and Production

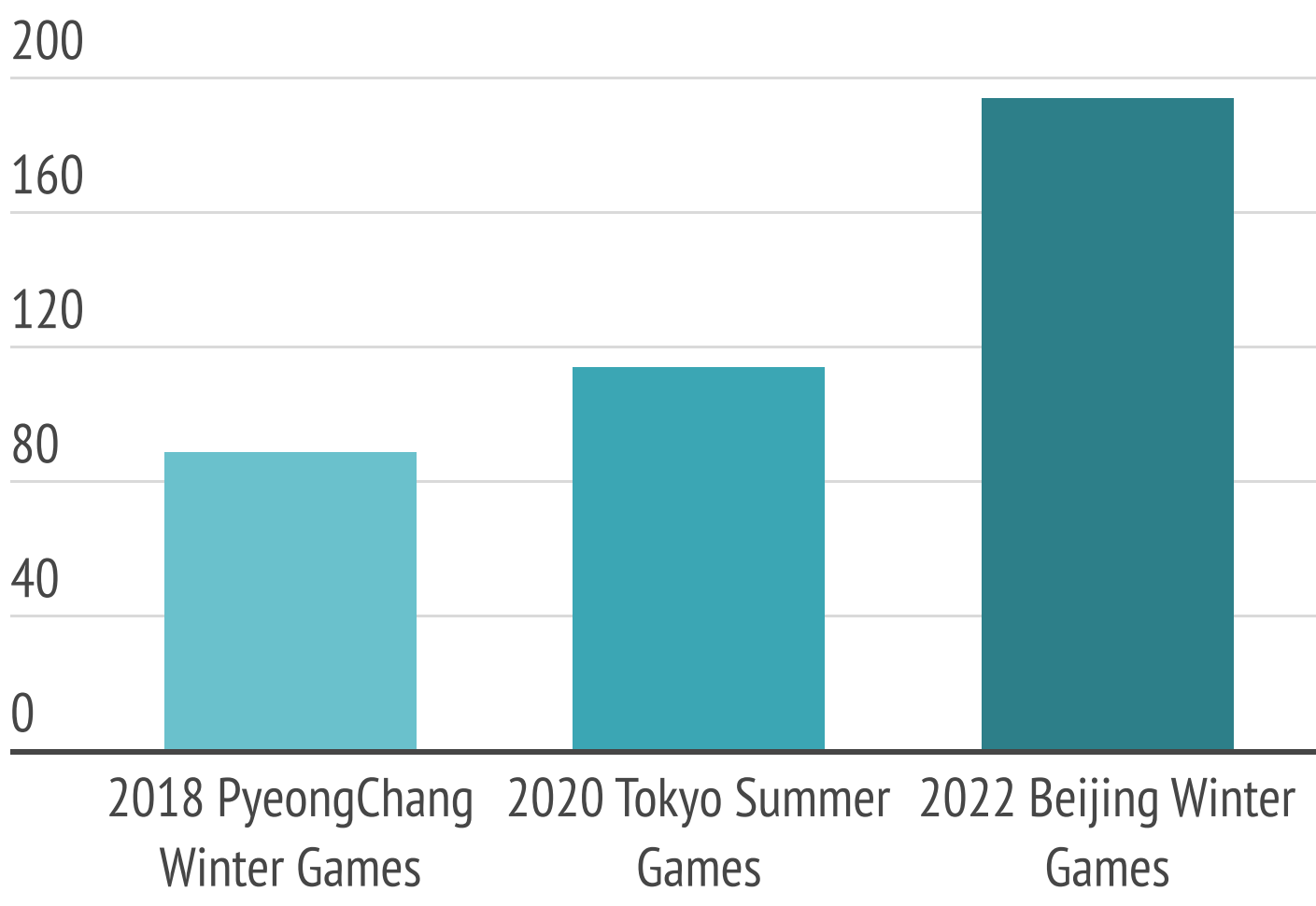
## Live Content - Sports Return

Sports events made a comeback in 2021, with some restrictions staying in place due to the ongoing COVID-19 pandemic. However, the viewership of major events like the Tokyo Summer Games dropped and was distributed across a larger number of broadcasters, services and devices.

Summer Games global viewership



Number of rightholders



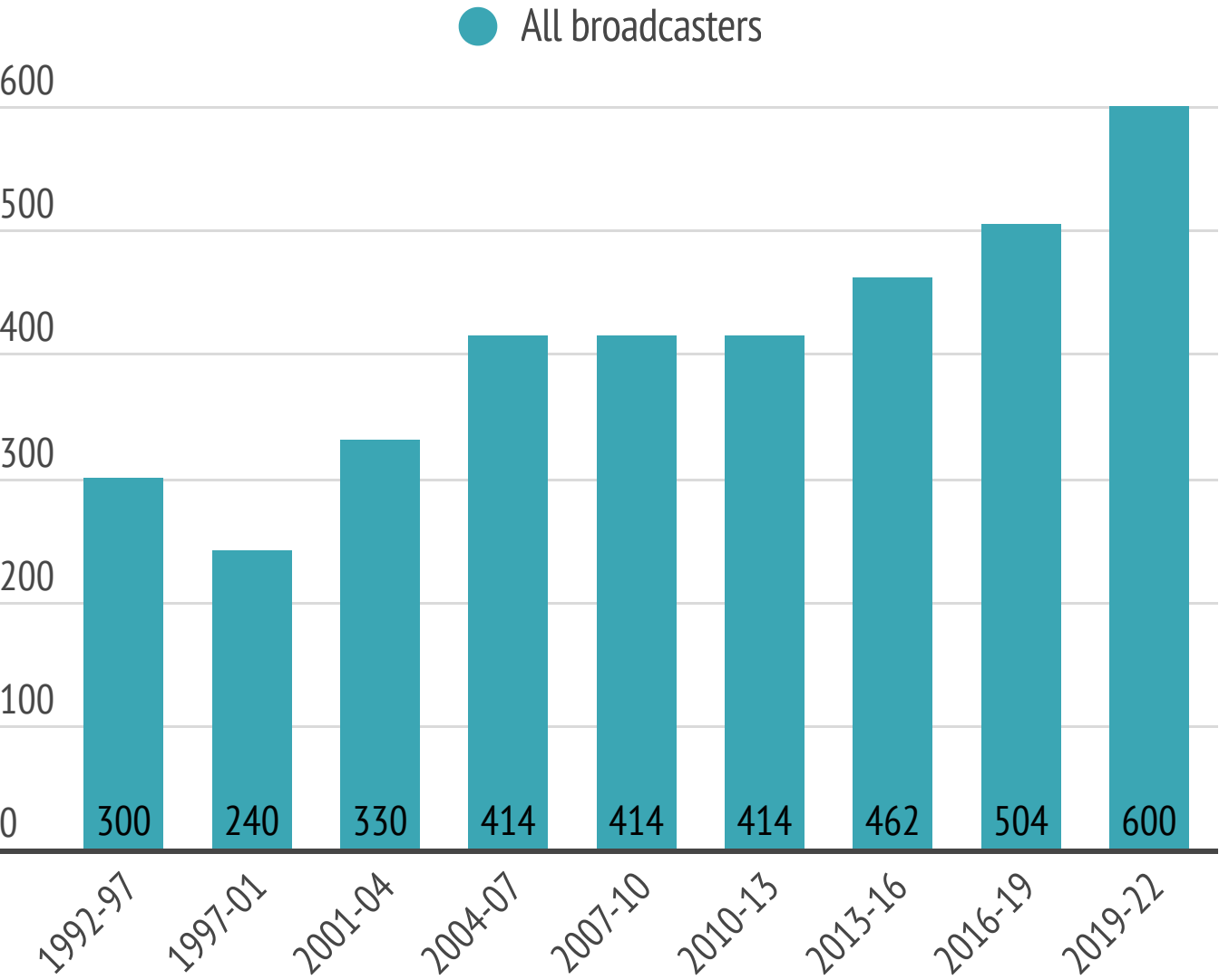
Sources: IABM, Nielsen, Sports Business Institute

# State of Content Creation and Production

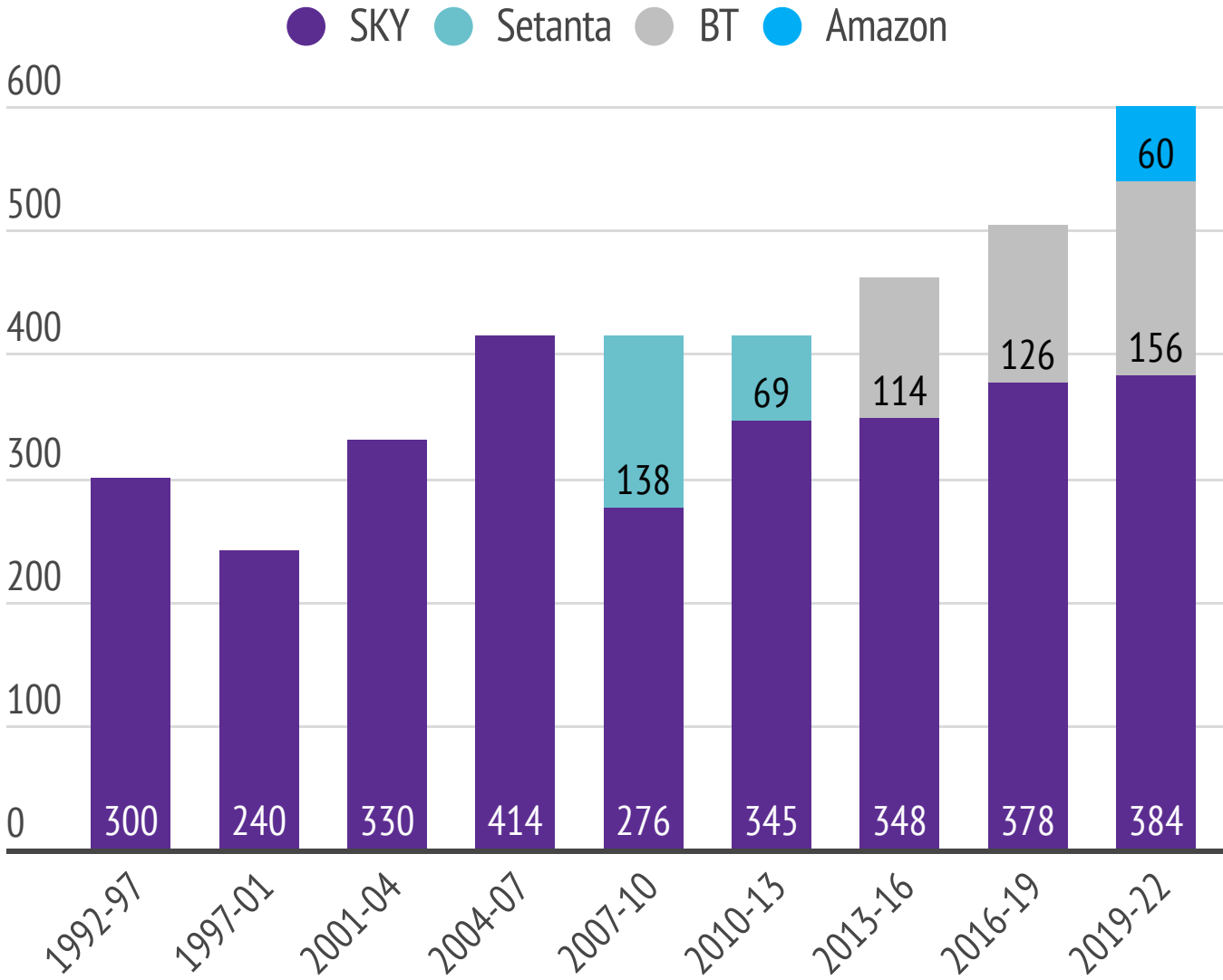
## Live Content - Sports Return

The English Premier League data confirms this: while the number of games continues to grow, competition for broadcasting rights also intensifies, leading to a decreasing number of games per broadcaster. As streaming services such as Amazon are entering the lucrative sports rights field, the competition is becoming even tighter.

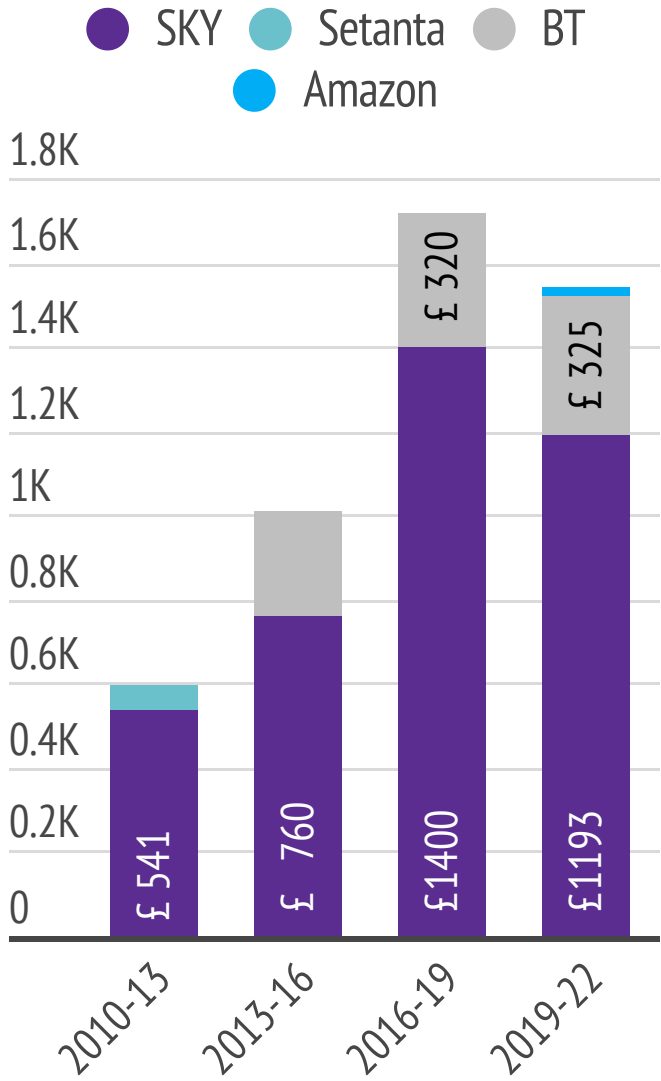
Total number of EPL games



EPL games by broadcaster



Cost of sports rights



Sources: IABM, Nielsen, Sports Business Institute



# Business and Tech Trends

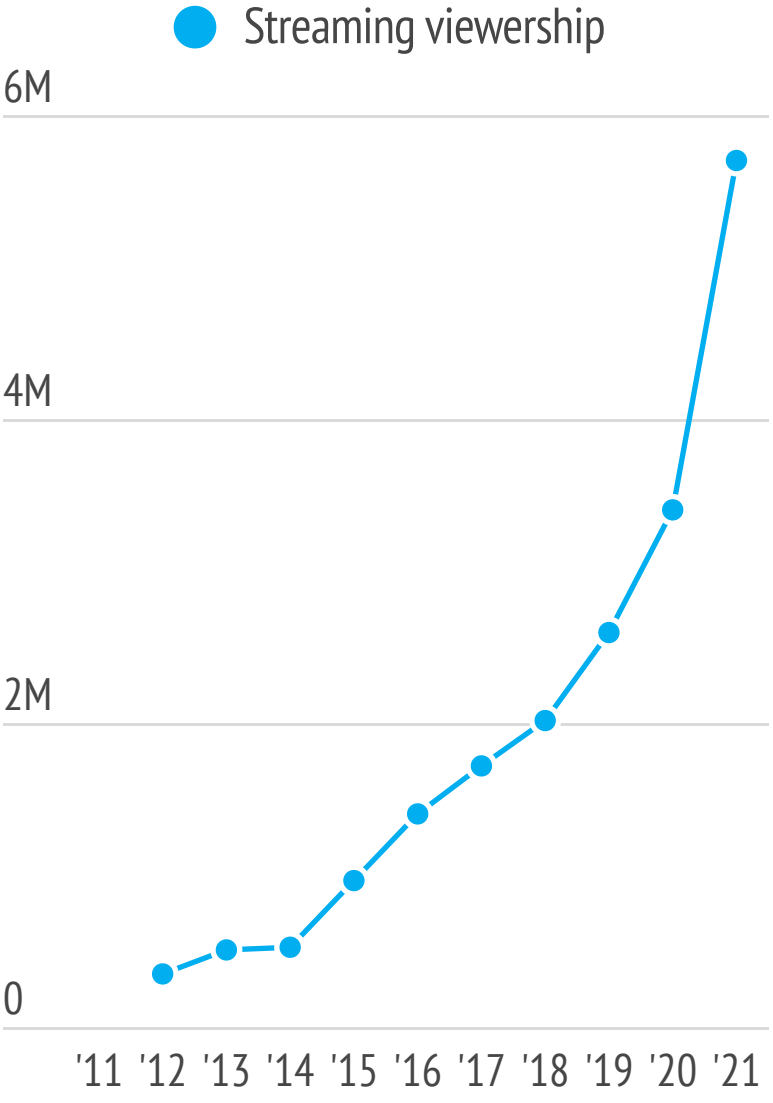
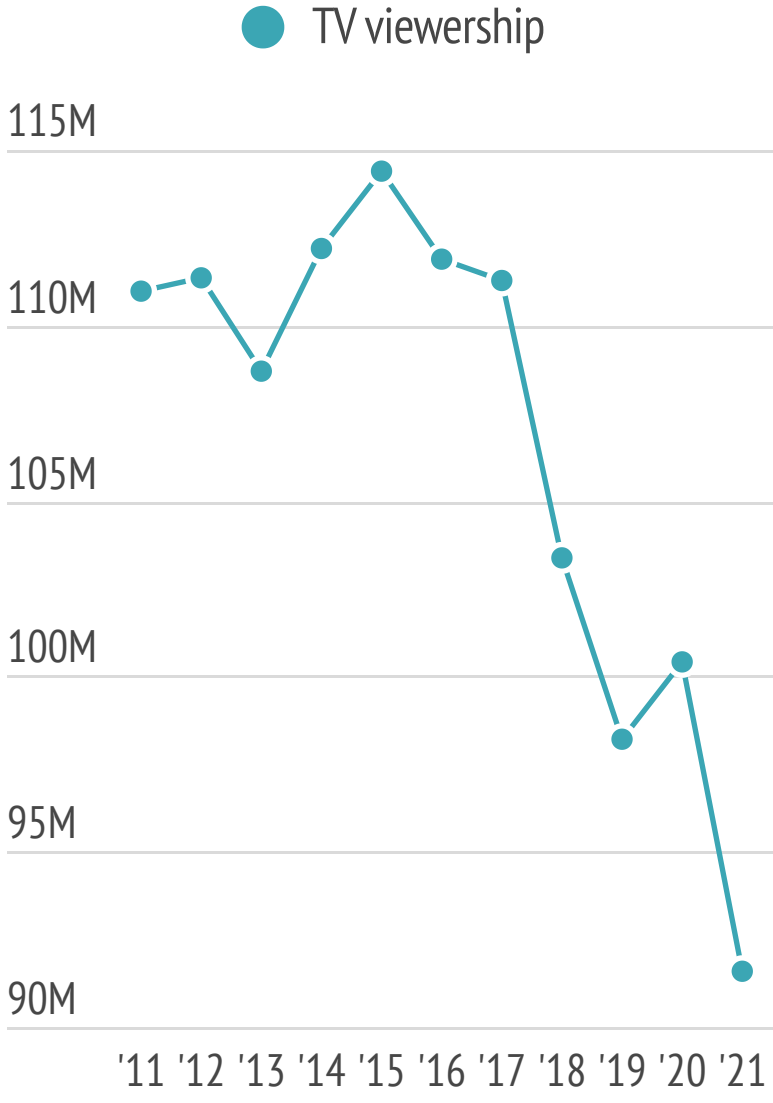
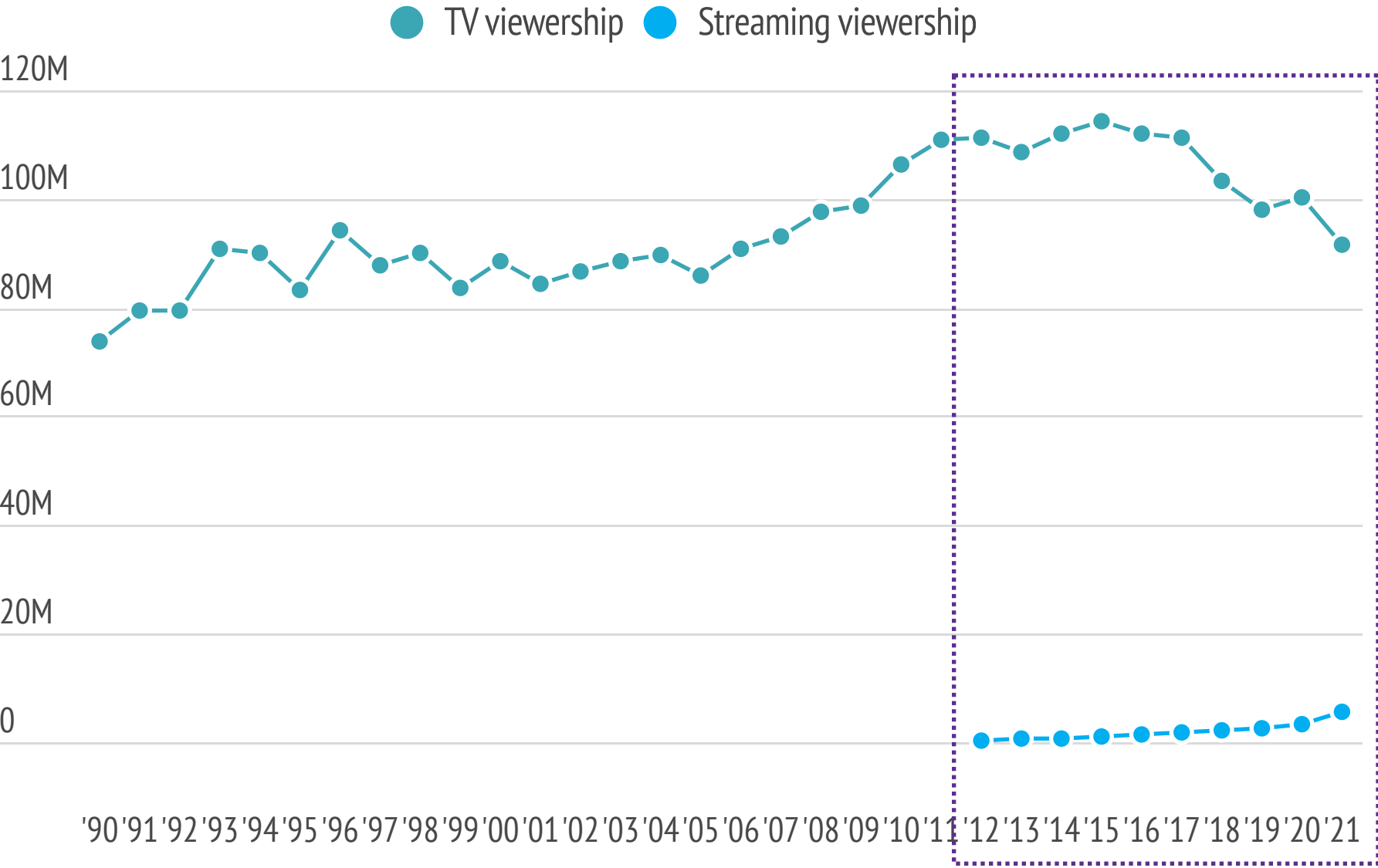


# Business and Tech Trends

## Direct-to-Consumer

Content creation and production are heavily affected by the transition to DTC business models, driving changes for media technology demand in all sectors, particularly live sports.

Super Bowl viewership in the US



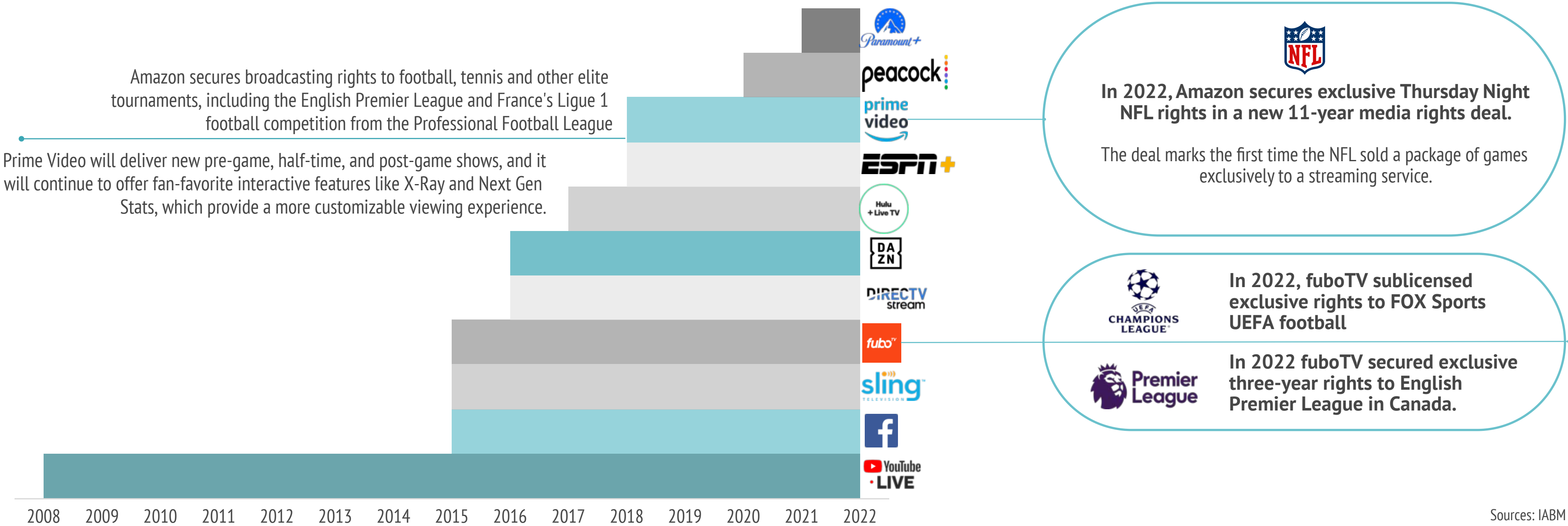
Sources: IABM, Sports Media Watch

# Business and Tech Trends

## Direct-to-Consumer

The Sports streaming landscape becomes more fragmented with Amazon Prime, fuboTV and DAZN buying sports rights.

Sports rights' purchases by streaming players



Sources: IABM

# Business and Tech Trends

## Direct-to-Consumer

Streaming services are forced to look for alternative value propositions for their viewers, boosting interactive features as a competitive advantage to linear broadcasting. The interactive features largely rely on graphics, including AR, to visualize live stats and games analytics, leading to the convergence of the sports sector with other industries such as gaming and betting.

”

Engagement levels are up 30-37% on connected devices when you factor in interactive elements into the video.

fuboTV CEO David Gandler

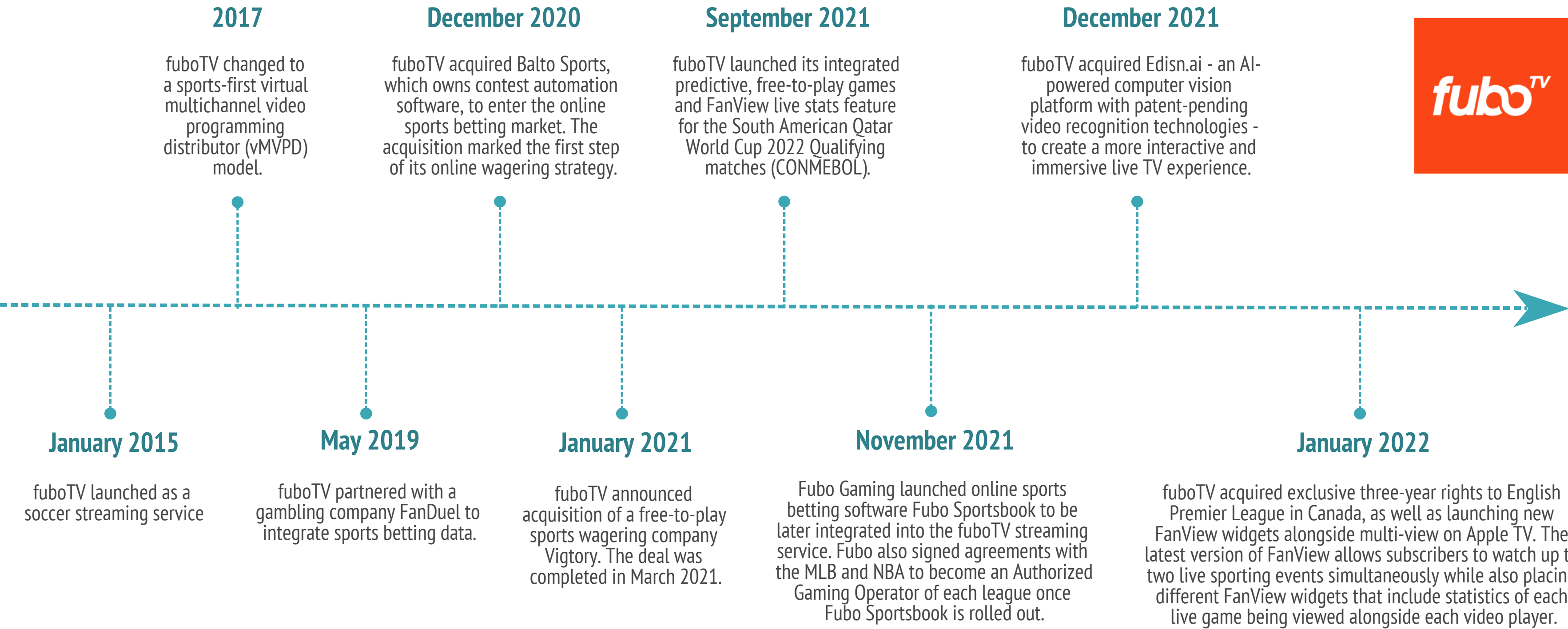


Sources: IABM, CNBC



# Business and Tech Trends

## Direct-to-Consumer



Sources: IABM



# Business and Tech Trends

## Direct-to-Consumer



### Largest investors in professional video content in 2021

COMCAST

\$22.7B

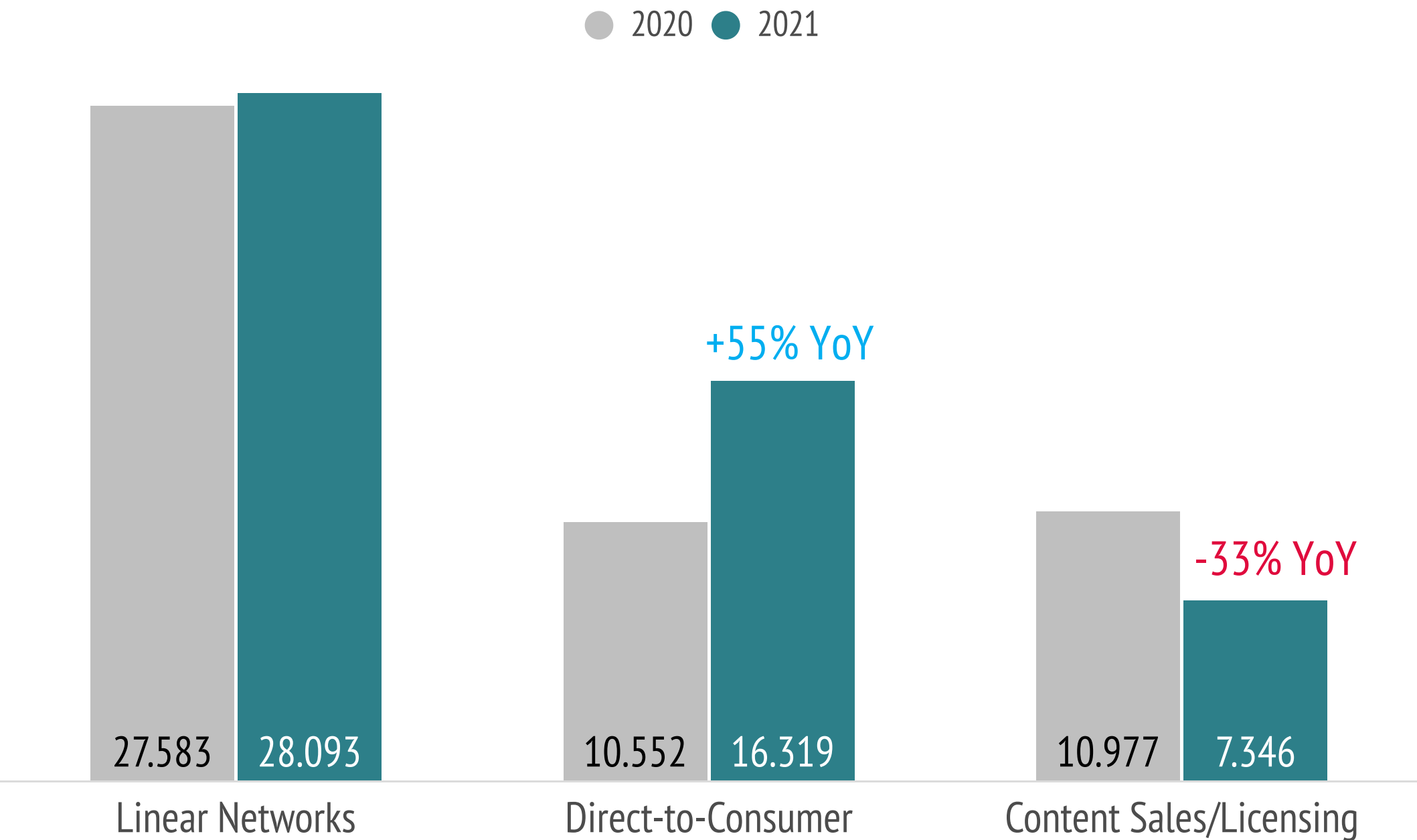
Comcast - having launched its own streaming service, Peacock, in 2020 - is investing heavily in original content as well as sports rights, the latter making up of over a third of its spend in 2021.

Walt Disney

\$18.6B

Fuelled by the success of Disney+ launched in 2020, Disney continues its hefty investments in original programming as well as sports rights.

### Disney Media & Entertainment Distribution Segment Revenues



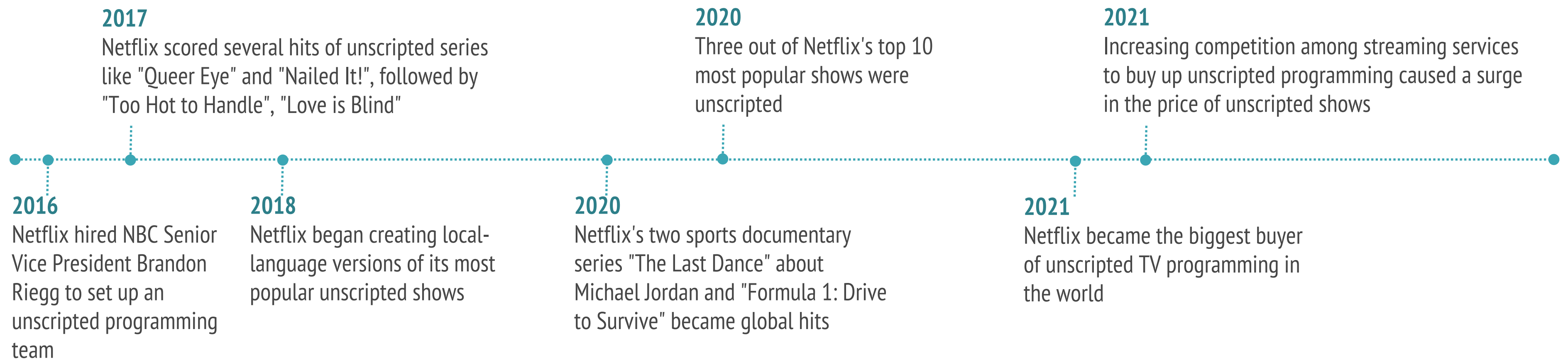
Sources: IABM, The Walt Disney Company, Ampere Analysis. Note: Largest investors in professional video content at group level, including non-originals



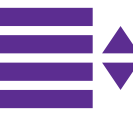
# Business and Tech Trends

## Direct-to-Consumer

Owing to the streaming-led content boom caused by the pandemic, streaming services - looking to expand their menu of originals - are increasingly investing in unscripted programming, which is significantly cheaper to produce. According to Bloomberg's estimate, an entire season of a reality show such as "FBoy Island" on HBO Max costs approximately the same as 1-2 episodes of a top drama. As a result, streaming services are now quickly buying up all available unscripted programming to enrich their content portfolios.



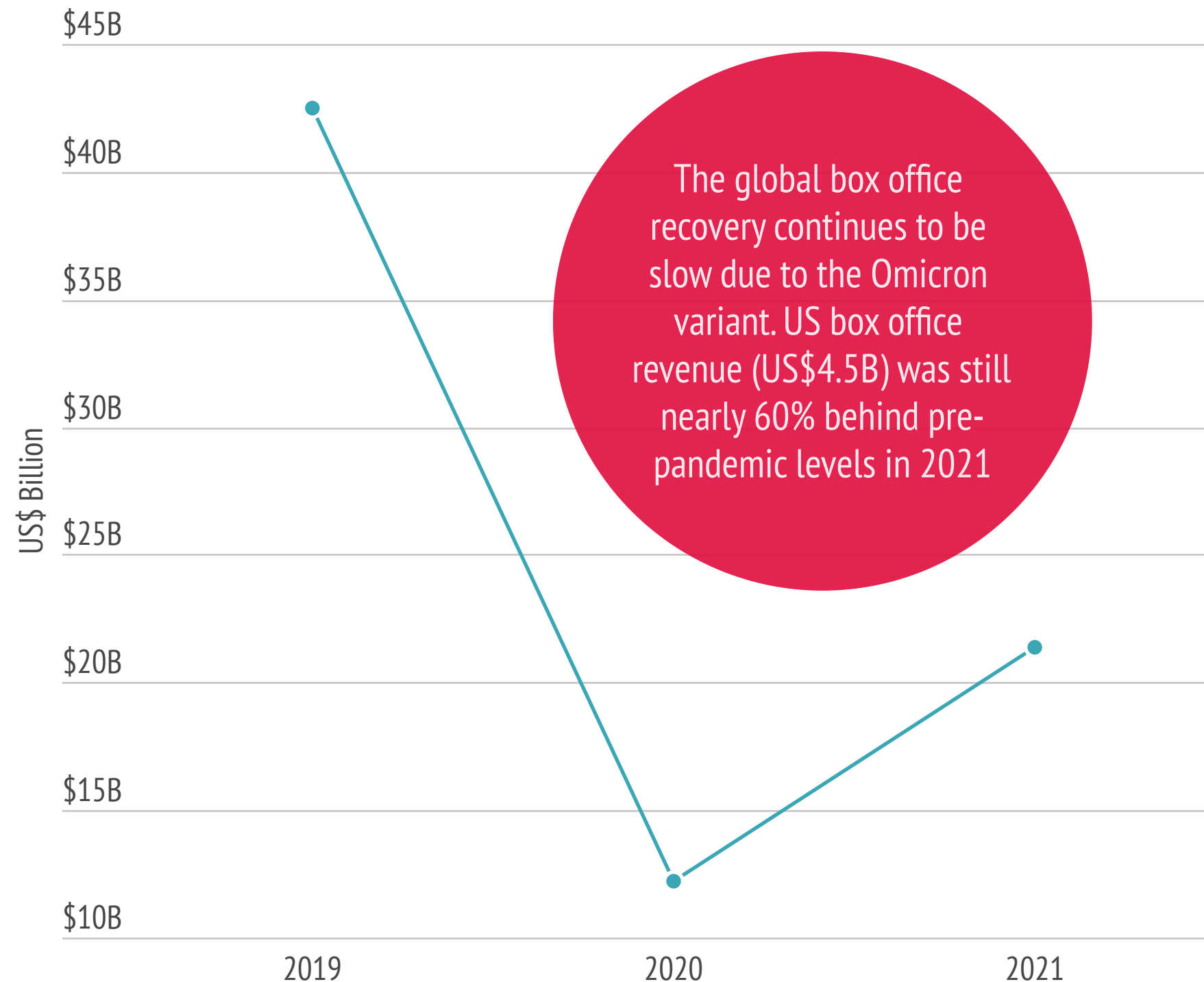
Source: IABM, Bloomberg, Netflix



# Business and Tech Trends

## Direct-to-Consumer

### Global Box Office Revenue



### Impact on Creation & Production Tech:

The content-led streaming boom - pushing media companies to debut their new movies simultaneously in cinemas and online - has shifted the focus of content production to TV films and series designed for streaming-only distribution, keeping demand for cinema cameras strong. The accelerated transition to DTC in 2021 is speeding up cloud-based deployments and related investment.

Streaming services' increasing investment in original content in 2021 generated huge demand for studio space and skilled film crew, particularly in the UK and some East European countries like Romania and Hungary, where big streaming players have recently shifted their productions thanks to attractive, novel filming locations, generous tax relief systems and lower production costs.

Sources: IABM, Comscore, Lambert Smith Hampton, Gower Street Analytics



# Business and Tech Trends

## Direct-to-Consumer

### Streaming Services' Film Studio Investments in the UK

Client	Contracted UK film studio	Year
NETFLIX	Shepperton Studios	2019
NETFLIX	Longcross Studios	2021
The Walt Disney Company	Pinewood Studios	2021
aws	Bray Film Studios	2021
aws	Bovingdon Airfield	2021
The Walt Disney Company	Shinfield Studios	2021
WarnerMedia	Hanna-Barbera Studios Europe	2021
VIACOMCBS	Wattpad Webtoon Studios	2021
NBCUniversal	Carnival Films	2021
NBCUniversal	Elstree Studios	2021
NETFLIX	Enfield Studios	2022
Apple	Tristan Aylesbury Studios	2021

Streaming services are particularly attracted to invest in the UK thanks to tax credit schemes, highly skilled English-speaking production resources and historic filming locations.

”

What we're trying to do is open the door to people and support them. We want to be the best studio that provides the most **training opportunities** in the UK and across all our content and productions here, to really make a difference and **diversify** the industry.

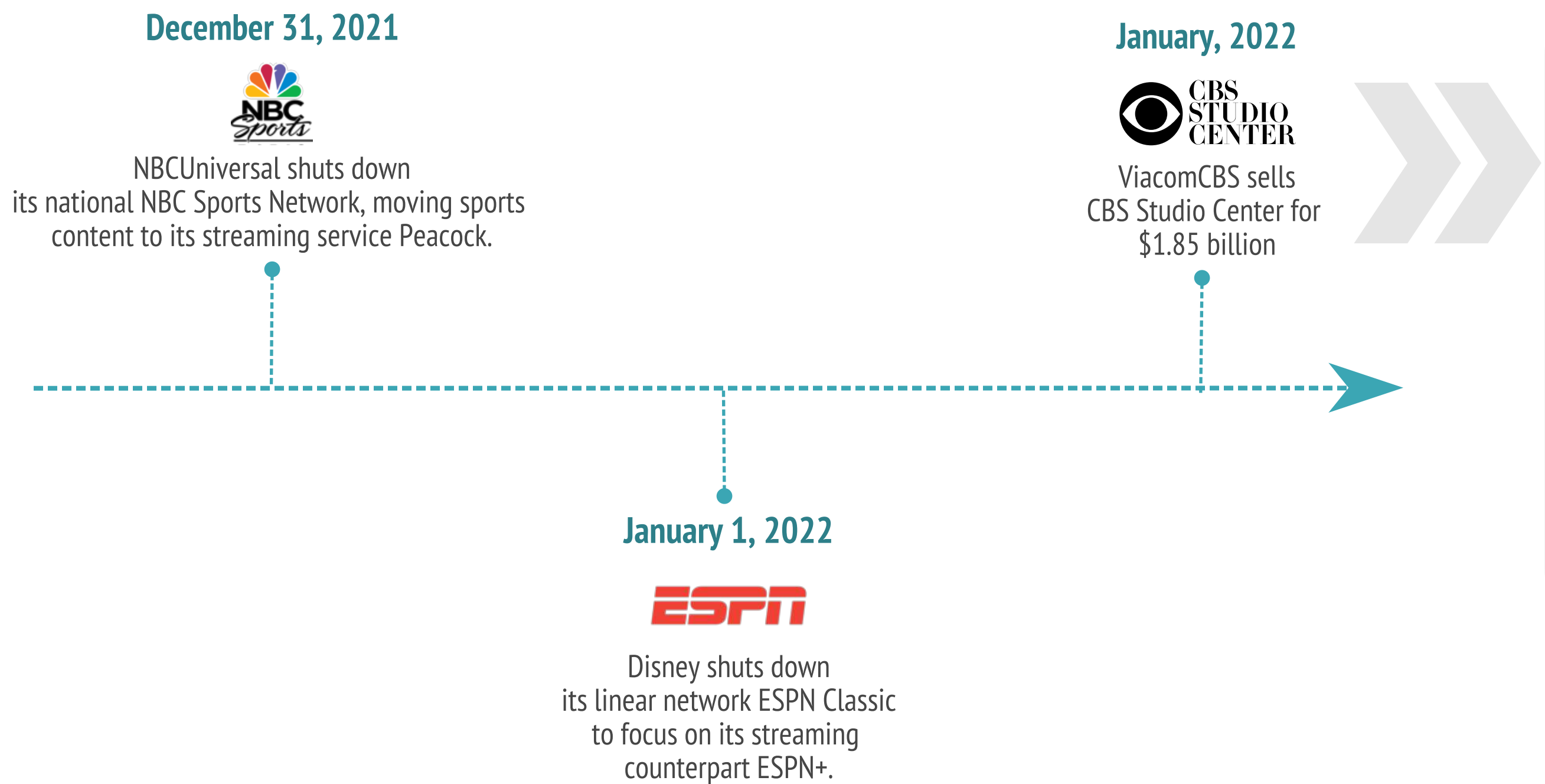
**Alison Small, UK Training Manager at Netflix,**  
[commenting on Netflix's Grow Creative UK Training Programme launched in 2021 to train 1,000 people from diverse backgrounds]

Sources: IABM, The Guardian, The Variety, Netflix

# Business and Tech Trends

## Direct-to-Consumer

The rise in streaming consumption is forcing broadcasters to rationalize spending in legacy divisions.



”

This sale is part of an ongoing optimization of ViacomCBS' real estate and operations portfolio and will allow the company to re-deploy capital to strategic growth priorities, including streaming

**Naveen Chopra**  
EVP and Chief Financial Officer  
ViacomCBS



Sources: IABM

# Business and Tech Trends

## Creator Economy



The COVID-19 pandemic funnelled people's social needs to social media and interactive platforms, which became the main source of entertainment for many users, consuming content created by bloggers, influencers and individual video-makers.

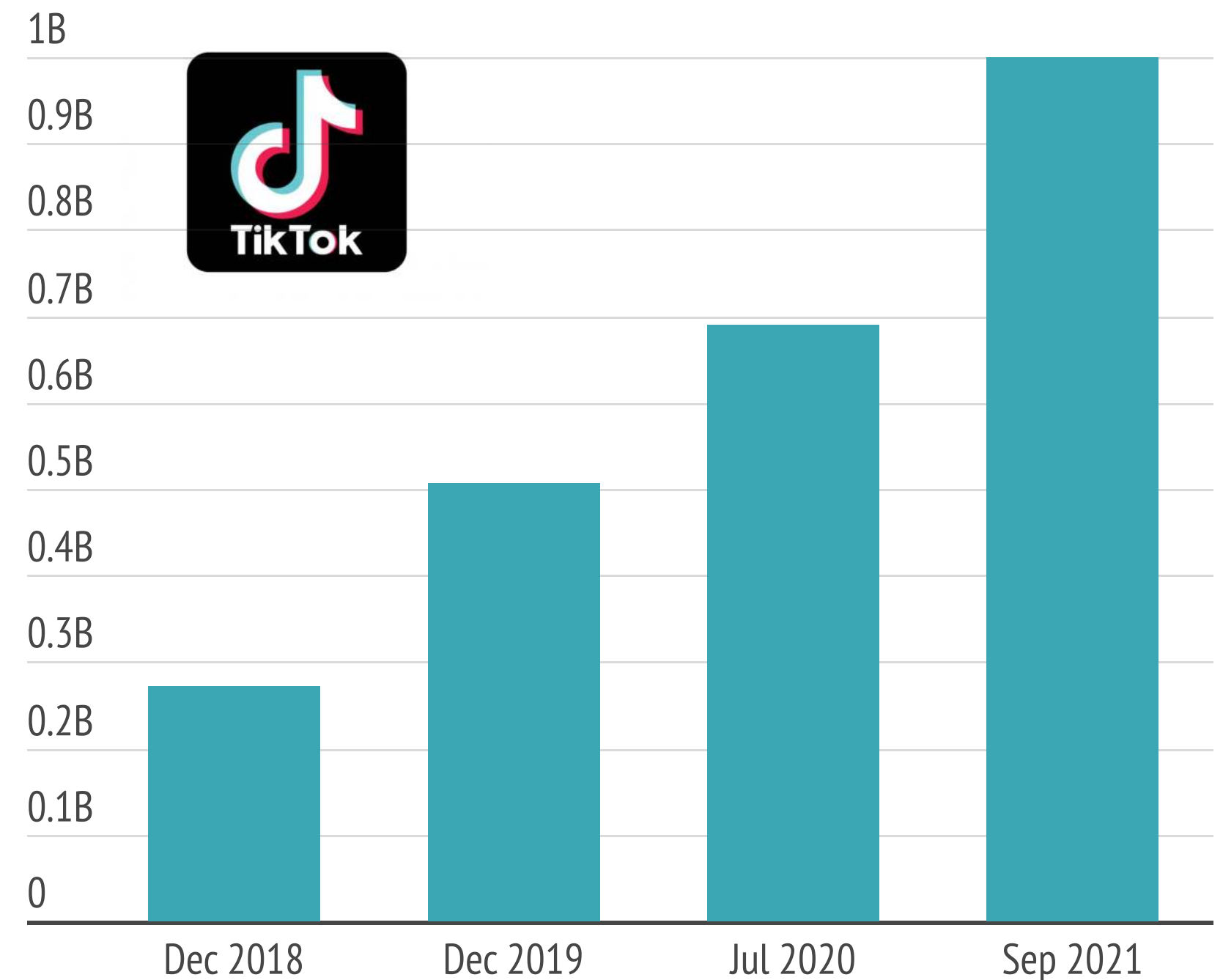


The new "creator economy", including small YouTube content creators that boast large audiences, is growing and represents an important, untapped market for many media technology suppliers.



Many platform providers have introduced specific tools like editing software to individual content creators helping them to monetize, collaborate and improve content quality to increasingly cater to these parallel media markets.

TikTok's Monthly Active Users Globally, 2018-2021



Sources: IABM, Forbes, Company Filings



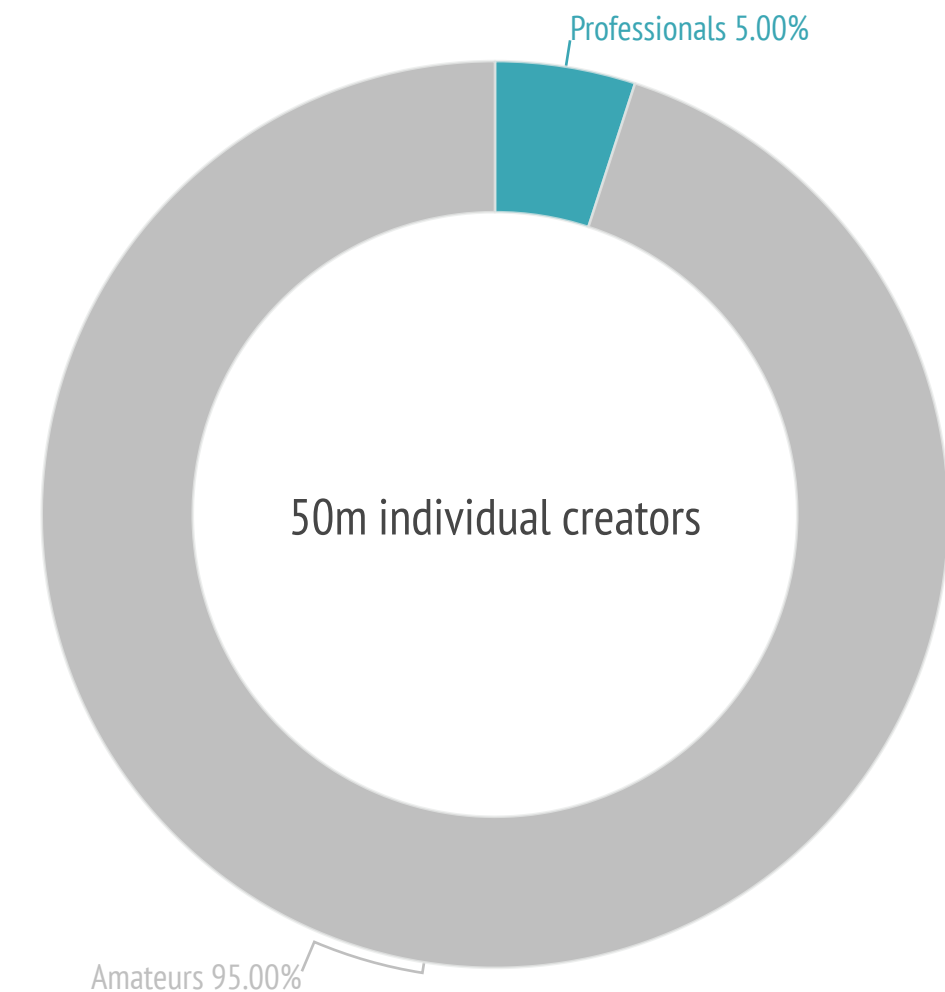


# Business and Tech Trends

## Creator Economy and User Generated Content (UGC)

In the last few years, technology democratization has made an increasing number of professional content creation technology tools more accessible to the masses, leading into the boom of the "creator economy". As a result, the creator economy has boomed, with an increasing number of people worldwide pursuing their passions and sharing the content they create on various user-generated platforms such as YouTube, Spotify, or TikTok. The site Influencer MarketingHub estimates that the creator economy is worth around \$100bn with SignalFire reckoning that about 50m individuals define themselves as content creators - though only 5% of them do it professionally (full-time). The recent rise of Web3 technologies, including non-fungible tokens (NFTs), might give independent creators even more tools and power over monetizing their audiences.

Estimated Size of the Creator Economy



Only 5% of independent content creators monetize content full-time

Sources: IABM, Influencer MarketingHub, SignalFire



# Business and Tech Trends

## Creator Economy and User Generated Content (UGC)

### Media Businesses

The creator economy is competing with media businesses by driving audiences away from traditional media

The creator economy is providing media businesses an alternative programming source to attract younger viewers

The creator economy is providing media businesses opportunities to differentiate their business models

### Media Tech Suppliers

The creator economy is providing media tech suppliers a new growth opportunity if they re-engineer their business models

The size of this opportunity will depend on the financial success of the creator economy

This should also affect selling models in media tech requiring suppliers to move to a more B2C approach to sales

Sources: IABM



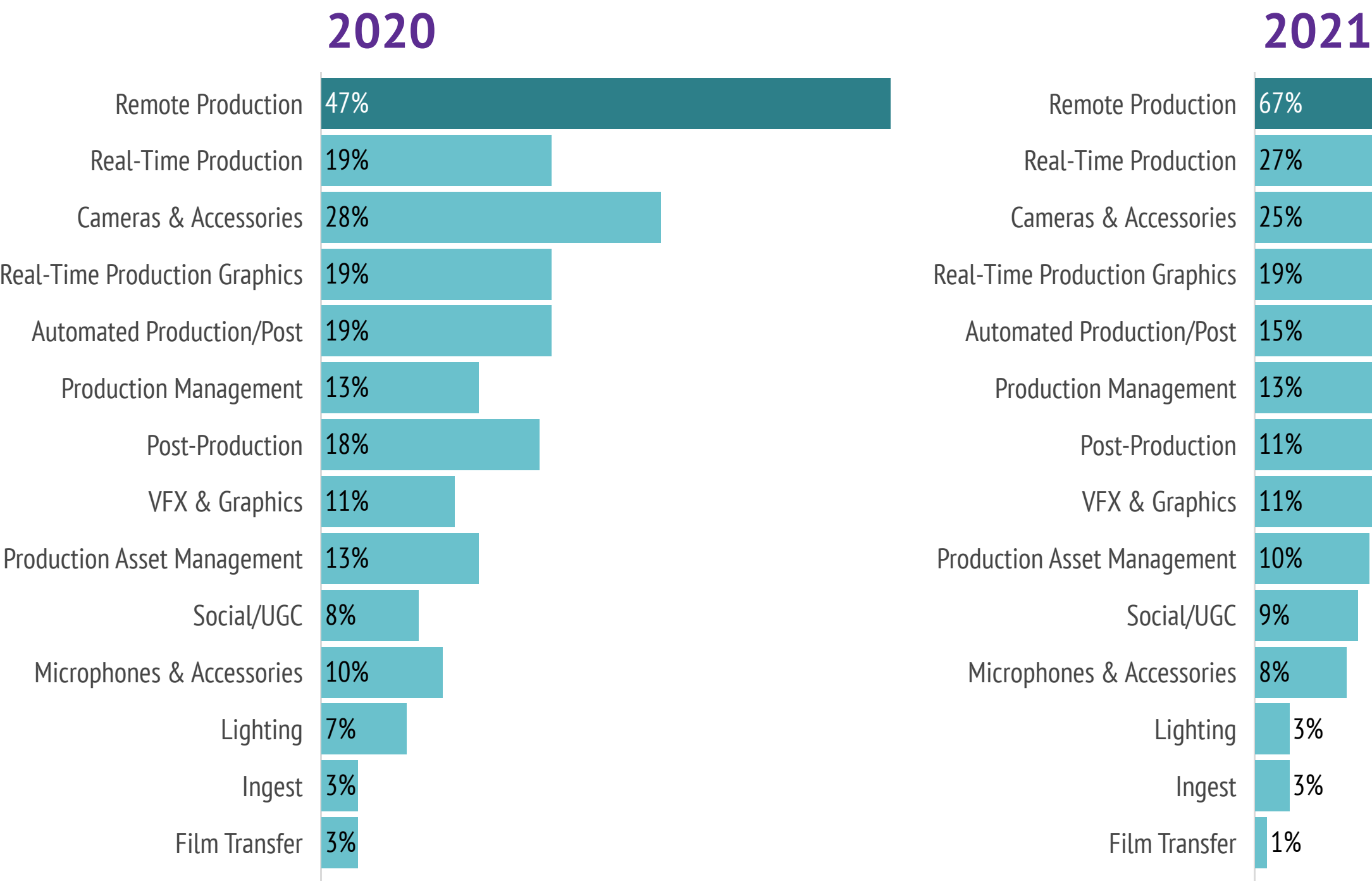
# Business and Tech Trends

## Cloud & Remote



### Fastest-growing Areas of Investment in Create & Produce

Q. Please select the most important technological drivers of investment in each of the content supply chain segments that are relevant to your organization.



Remote production was already the fastest-growing area of investment in 2020. In 2021 investment in remote production became mainstream - most of the end-users, as well as media technology vendors and service providers reported remote production to be the fastest-growing investment area.

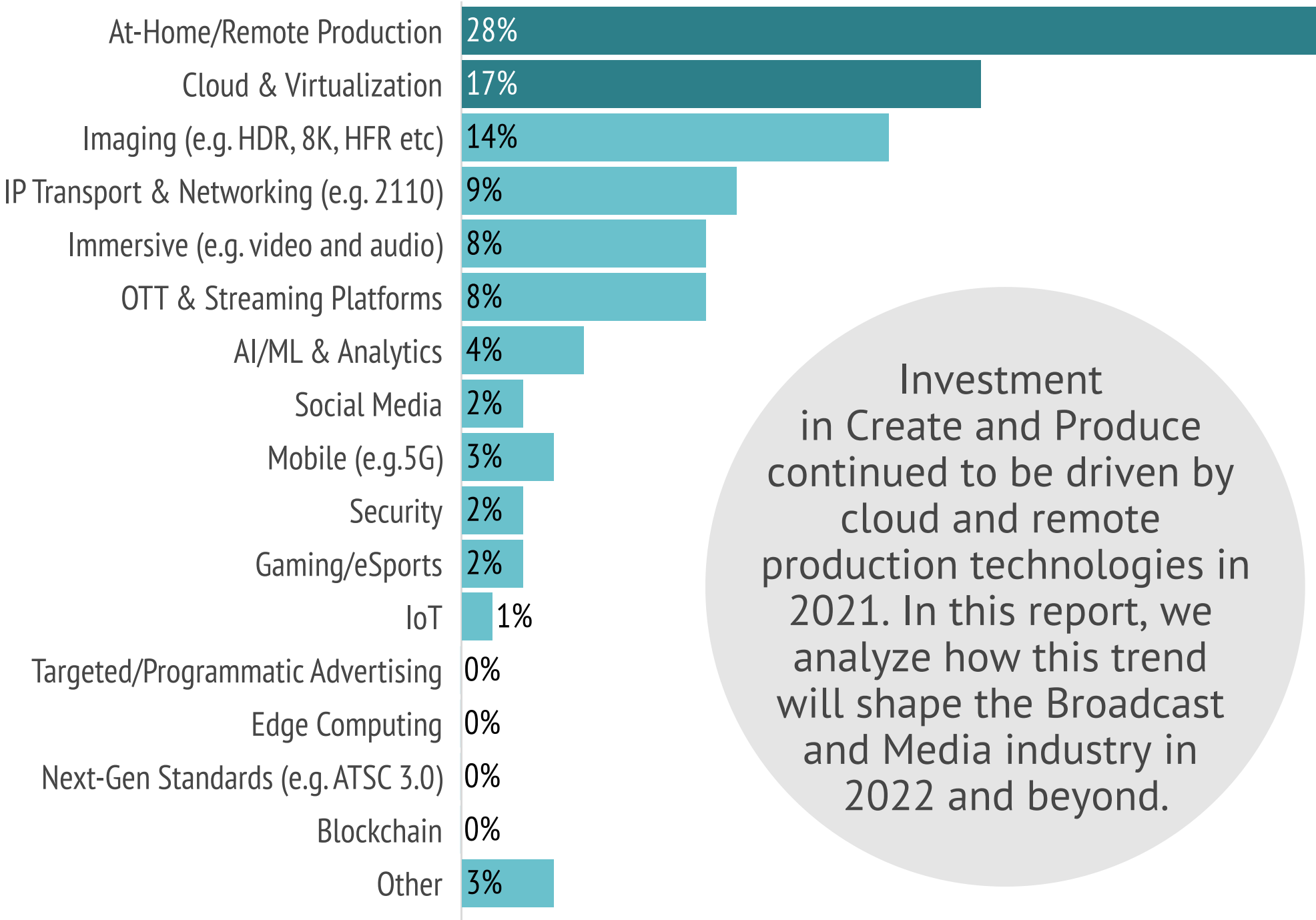
Sources: IABM

# Business and Tech Trends

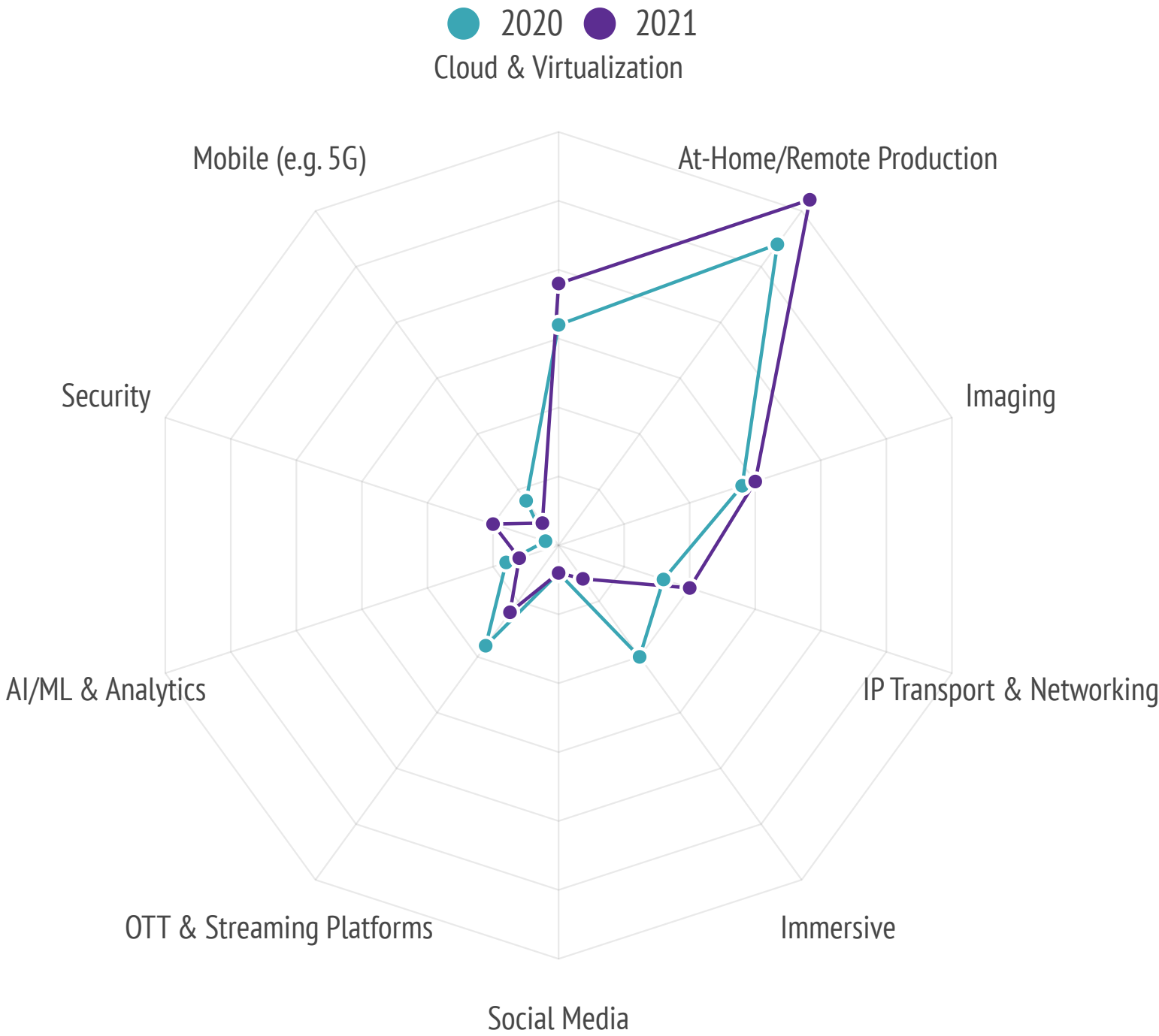
## Cloud & Remote



Investment Drivers in Create in 2021



Top 10 Investment Drivers in Create



Q. Please select the most important technological drivers of investment in each of the content supply chain segments that are relevant to your organization.

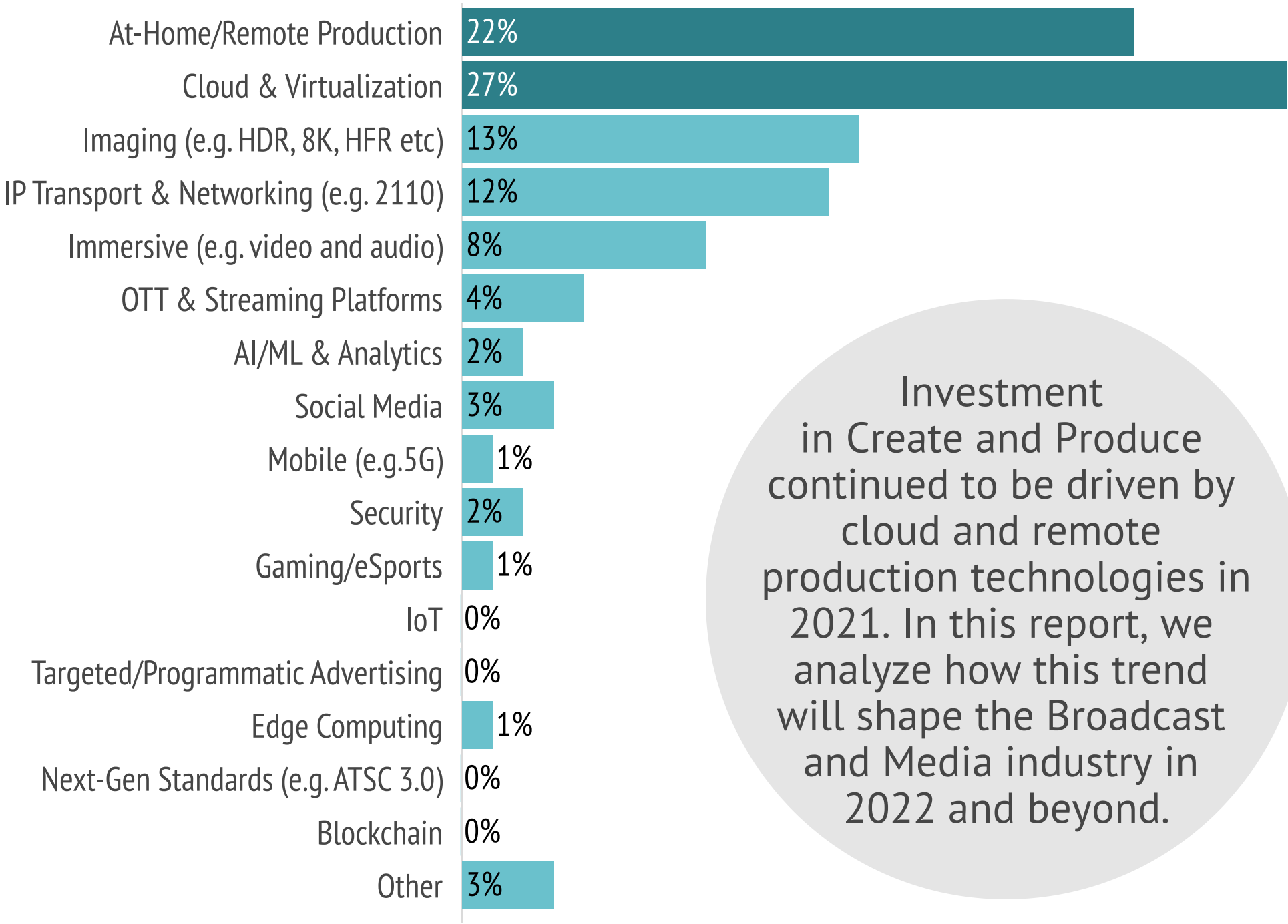
Sources: IABM

# Business and Tech Trends

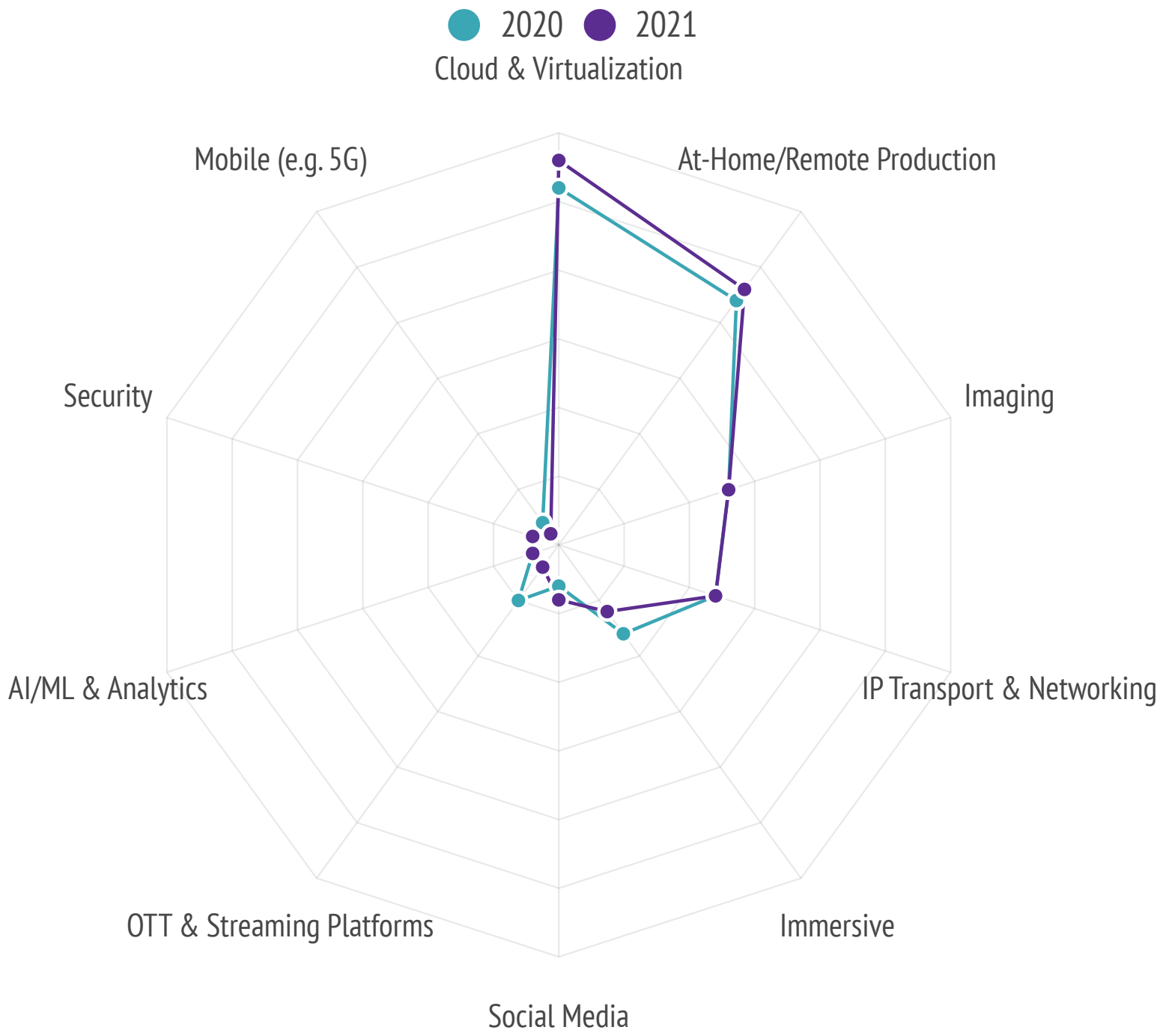
## Cloud & Remote



Investment Drivers in Produce in 2021



Top 10 Investment Drivers in Produce



Q. Please select the most important technological drivers of investment in each of the content supply chain segments that are relevant to your organization.

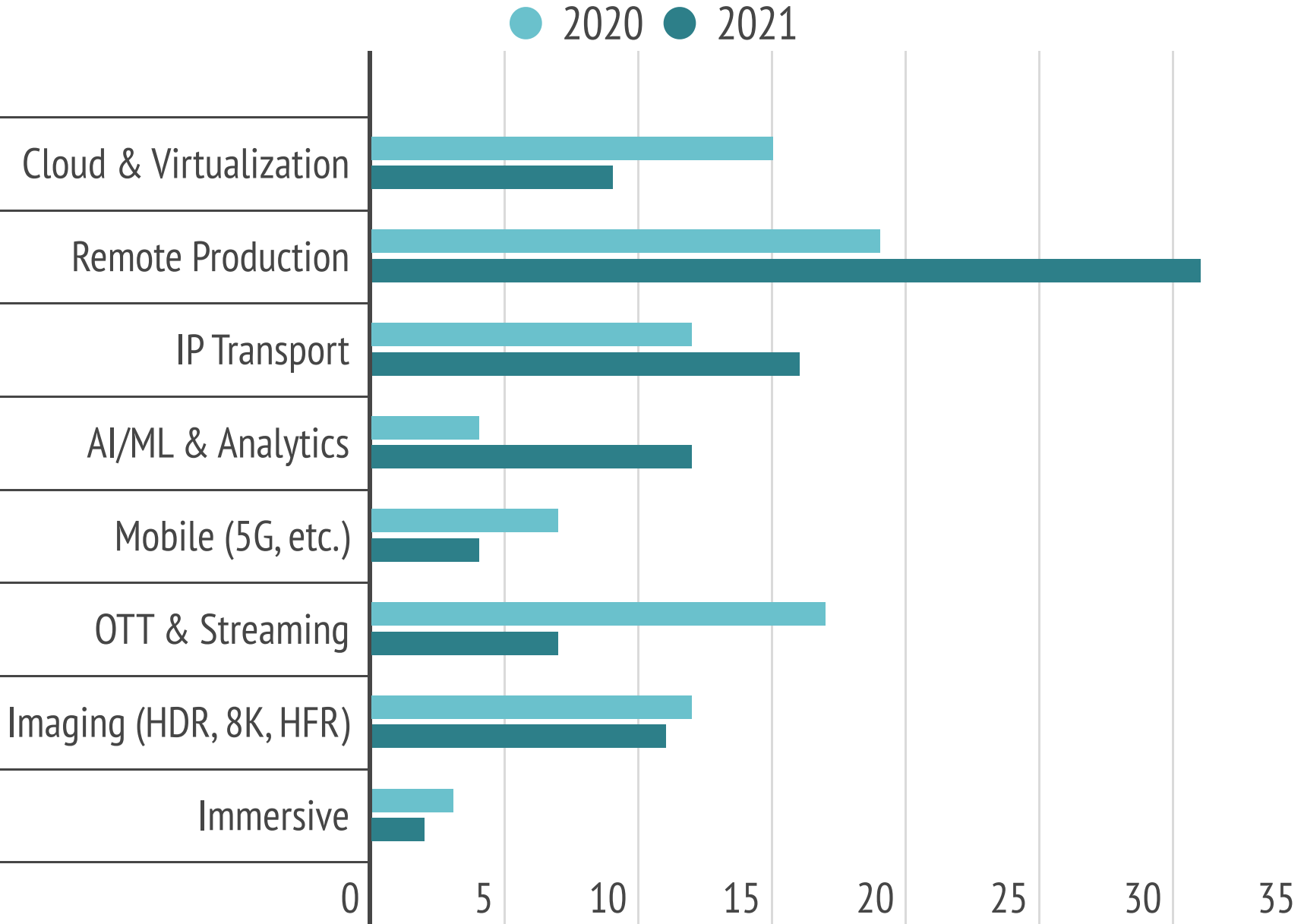
Sources: IABM

# Business and Tech Drivers

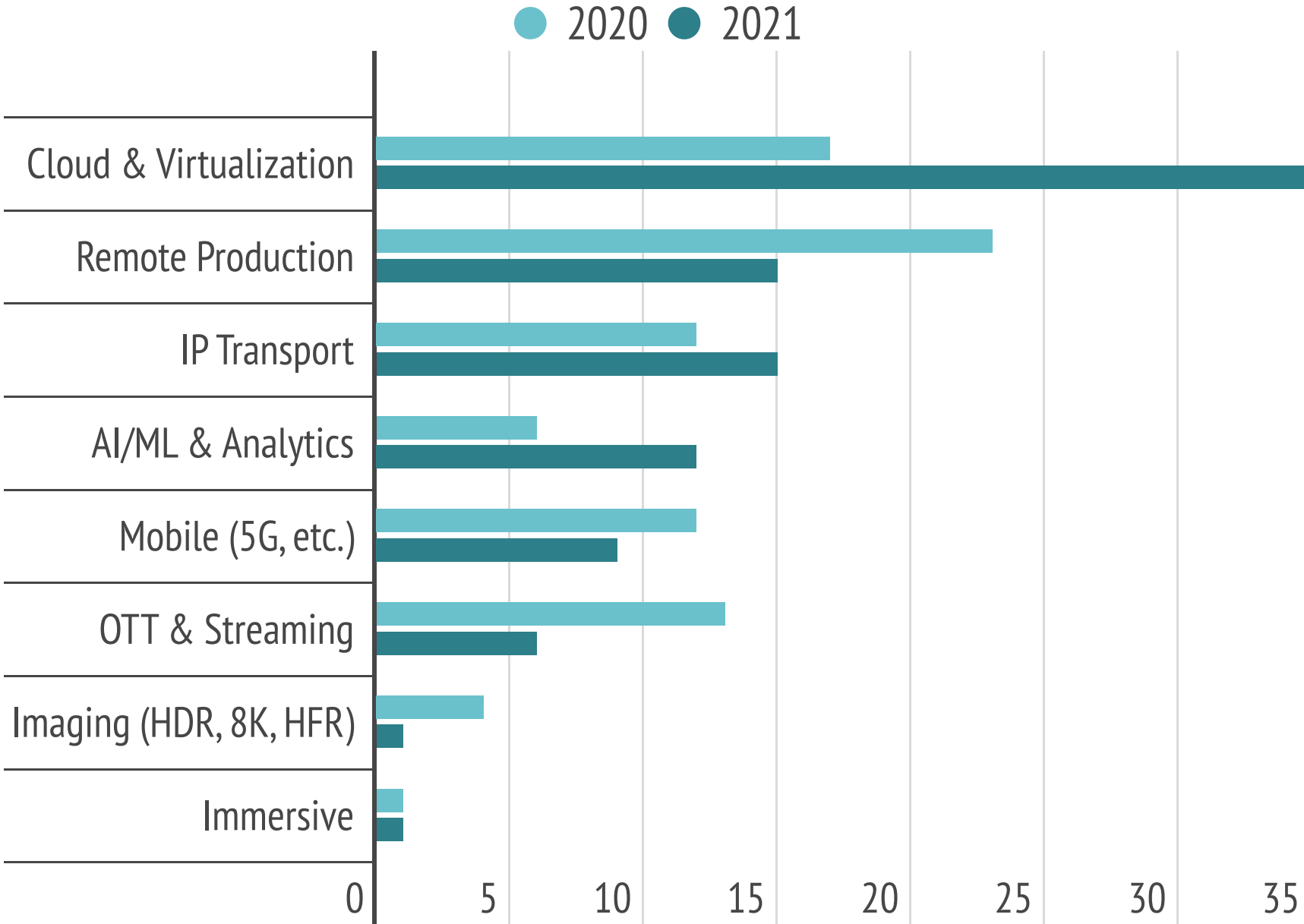
## Cloud & Remote

Sectors such as news and sports have very much focused on enabling the transition to remote production workflows while increasing their investment in cloud-based deployments.

Investment Drivers in Live Sports



Investment Drivers in Live News



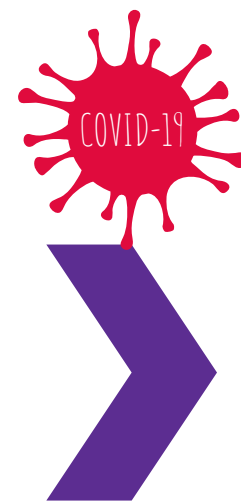
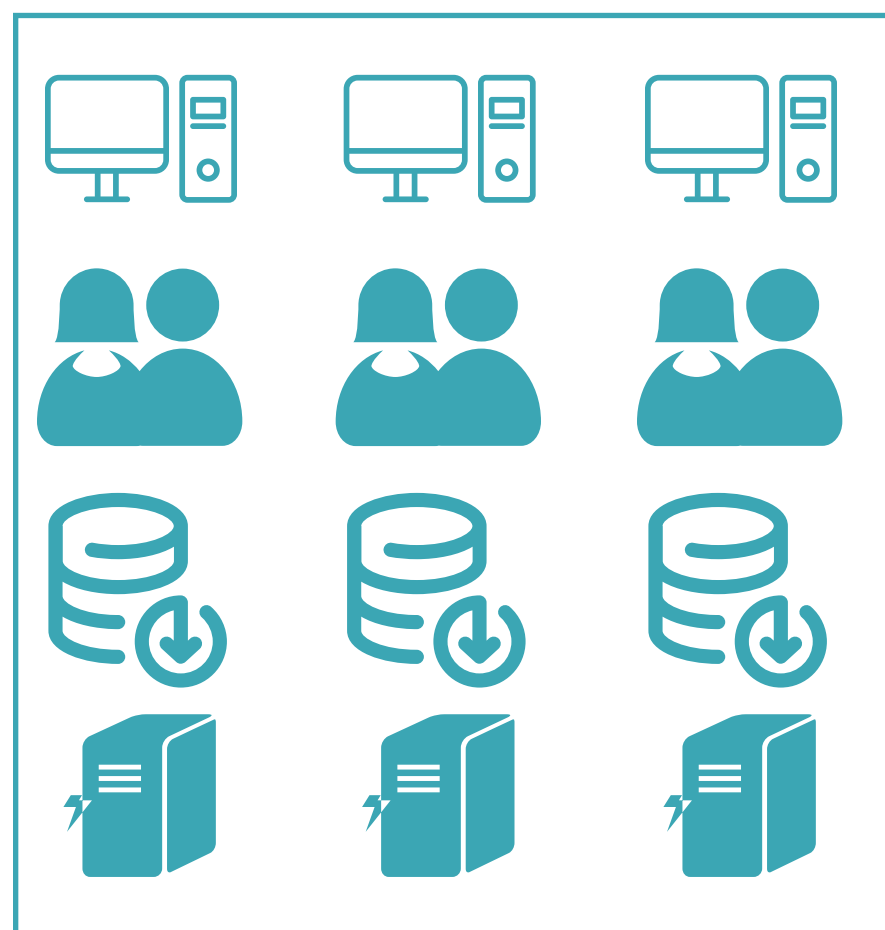
Sources: IABM

# Business and Tech Drivers

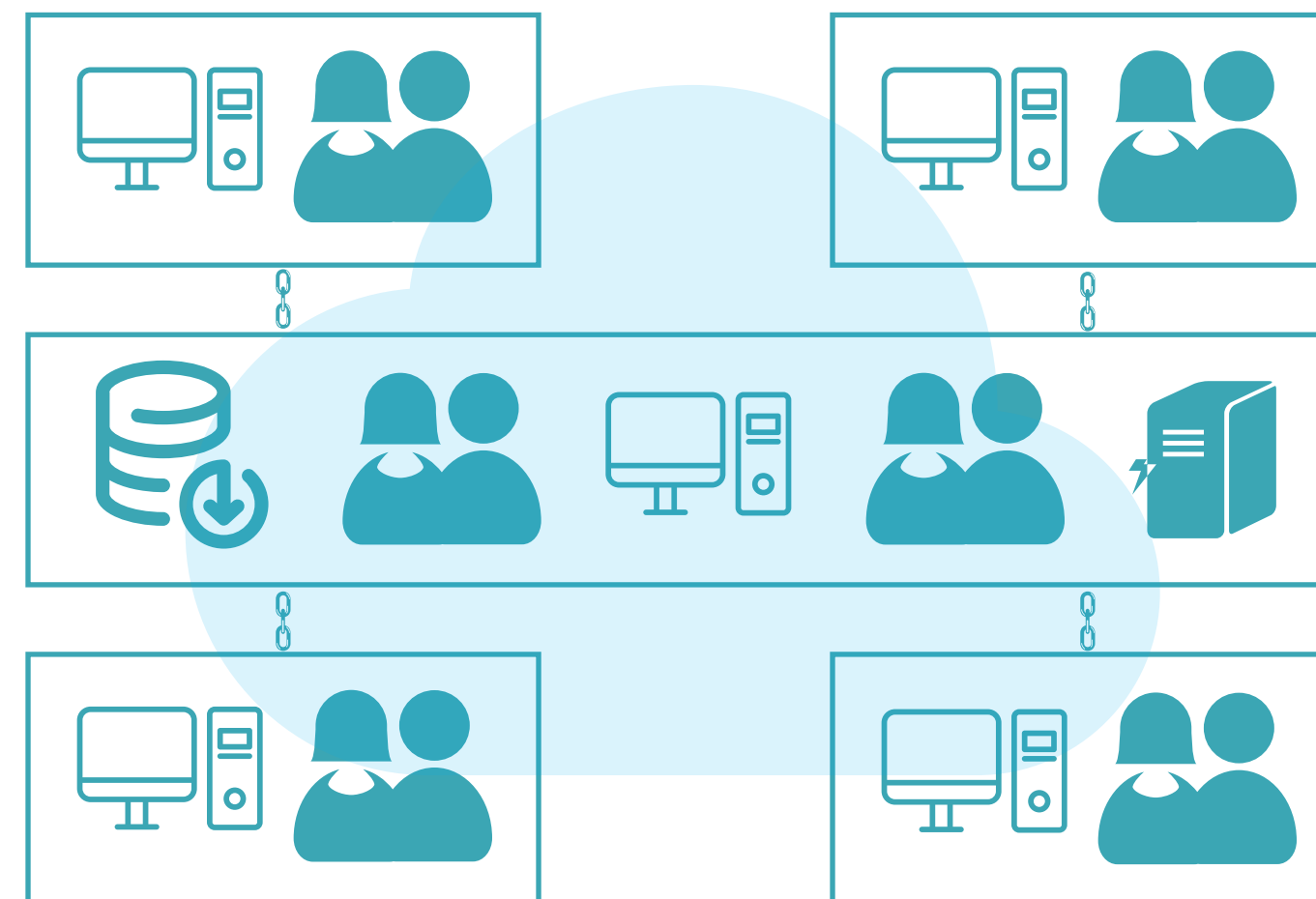
## Cloud & Remote

The main benefit of remote production is often claimed to be in asset centralization in one facility, which in turn enables increased content coverage and resource productivity, as well as cost savings in terms of reduced travel expenses. However, the COVID-19 pandemic has forced media companies to quickly deploy decentralized remote production models, which has changed the direction of their R&D investments.

Pre-COVID Plans (Centralized Model)



Post-COVID Reality (Decentralized Model)



Source: IABM

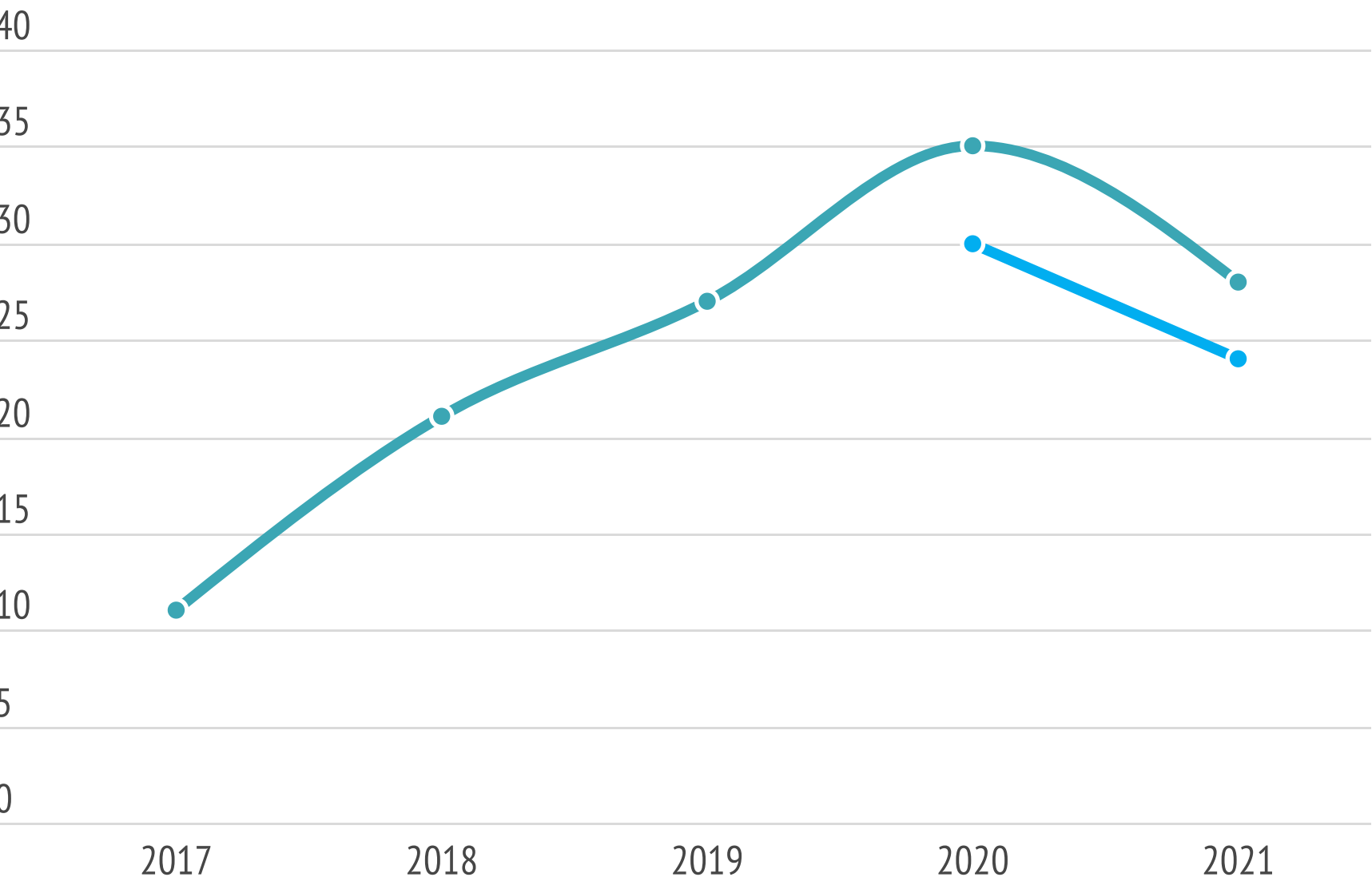
# Business and Tech Drivers

## Imaging and Immersive

As the UHD/HDR adoption trend matures, media technology investment is shifting to immersive technologies such as VR and AR.

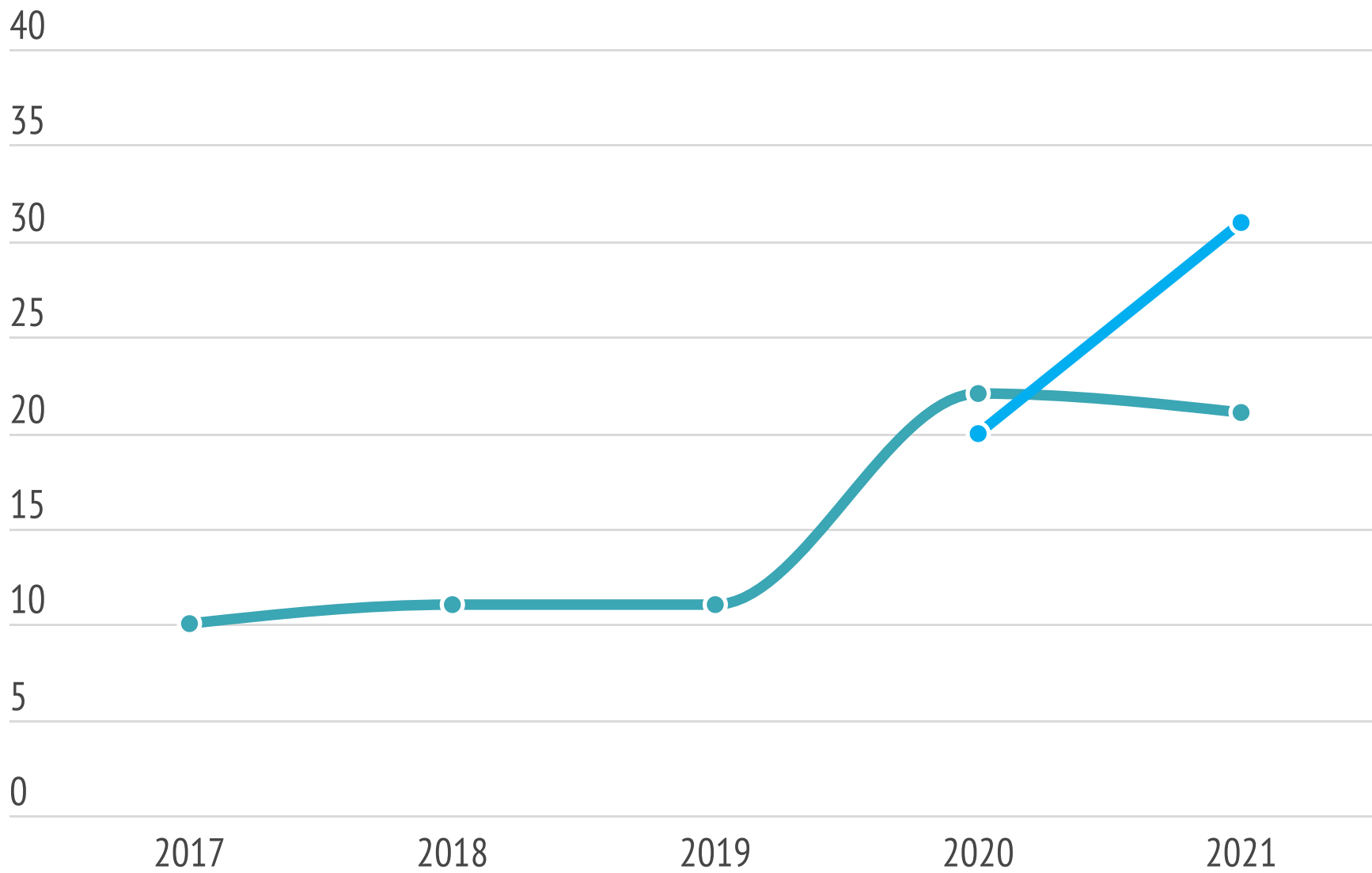
Imaging Adoption Trends

● UHD ● HDR



Immersive Adoption Trends

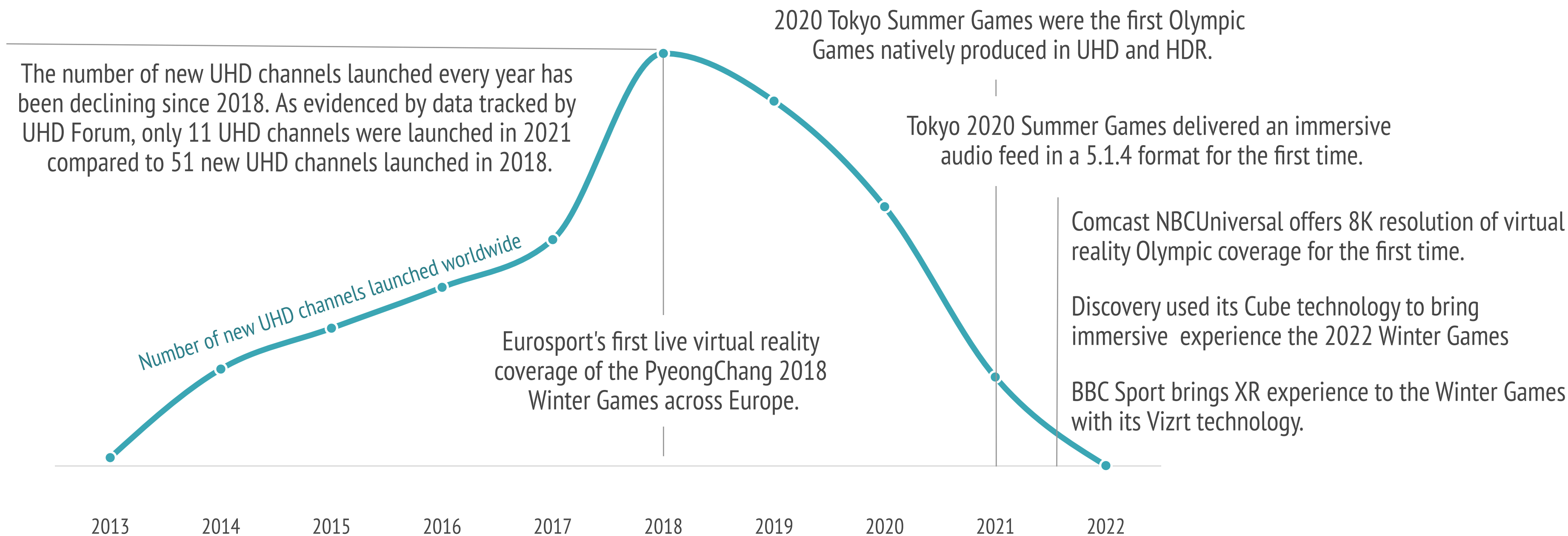
● VR ● AR



Sources: IABM

# Business and Tech Drivers

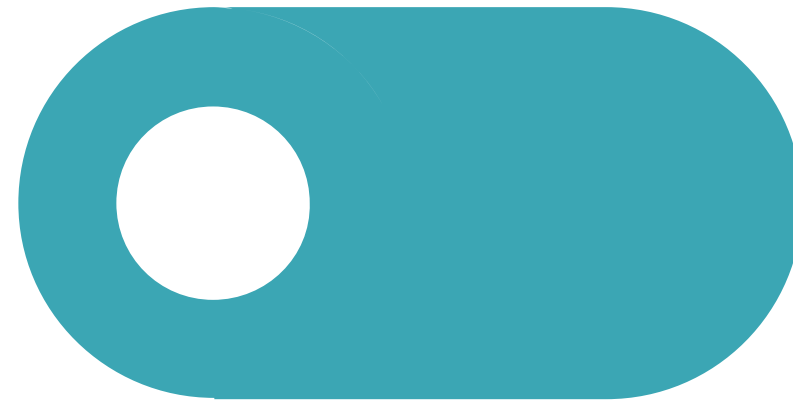
## Imaging and Immersive



Sources: IABM, UHD Forum



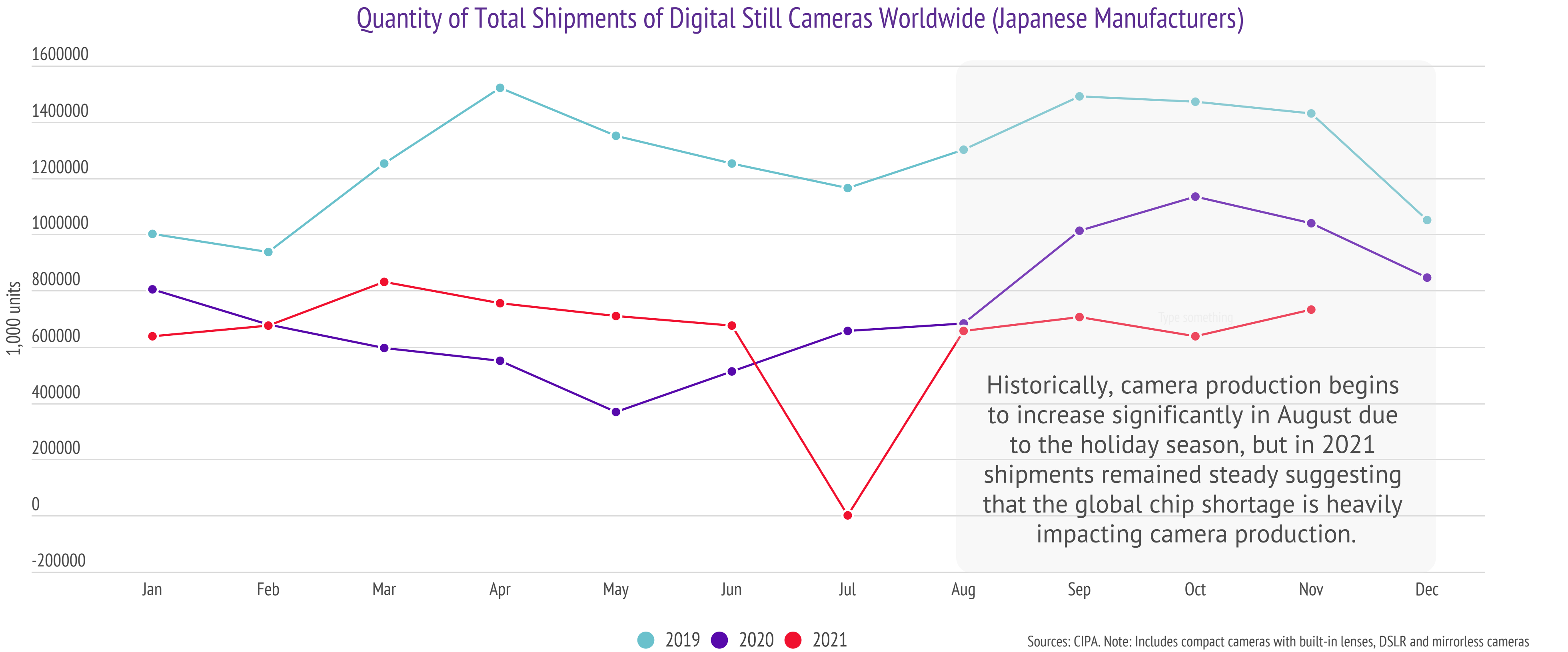
# Content Creation Tech





# Content Creation Tech

## Cameras - Global shortage of semiconductors suppressing camera shipments

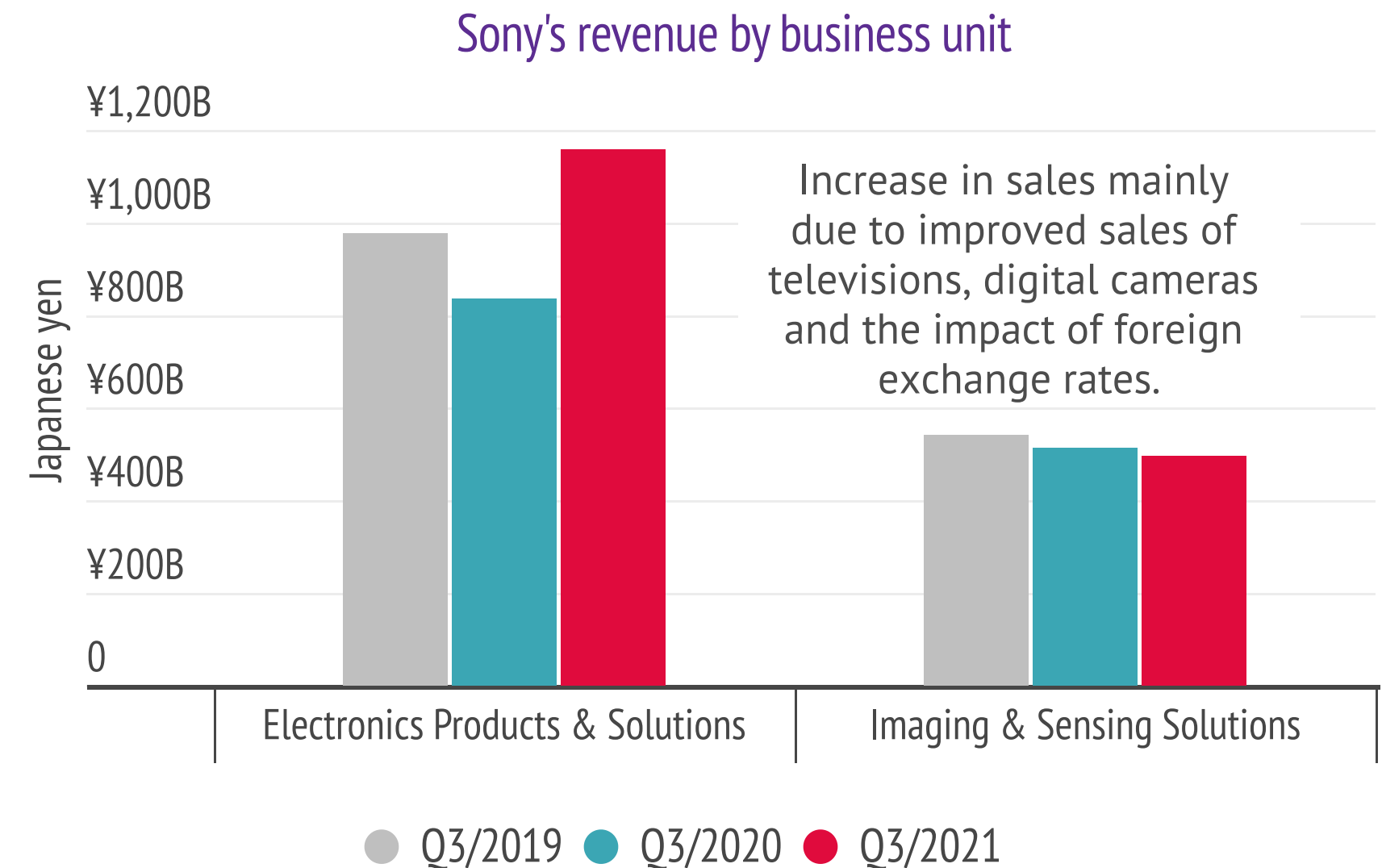


# Content Creation Tech

## Cameras - Suspension of new orders

Other camera suppliers like Sony reported that they have suspended orders for several recently launched camera models due to the global chip shortage. In December 2021, Sony announced on its website: *"With regard to digital imaging products, parts procurement is delayed due to the effects of global semiconductor shortages"*, following a series of announcements concerning temporarily discontinued products.

Camera (accessory) model	Suspension date
Sony ZV-E10 mirrorless vlogging camera	December 2021
Sony A7 II	November 2021
Sony A6400	November 2021
Sony A1600	November 2021
Sony ECM-B1M shotgun mic	November 2021
Sony PXW-Z190 camcoder	November 2021
Sony Handycam HDR-CX680 camcoder	April 2021
Sony A9	December 2021
Sony A7R II	December 2021
Nikon EH-7P AC adapter	June 2021
Canon EOS R3	December 2021
Fujifilm X-S10	September 2021



Sources: IABM, Sony, The Variety

# Content Creation Tech

## Cameras - Stagnation of production and sales

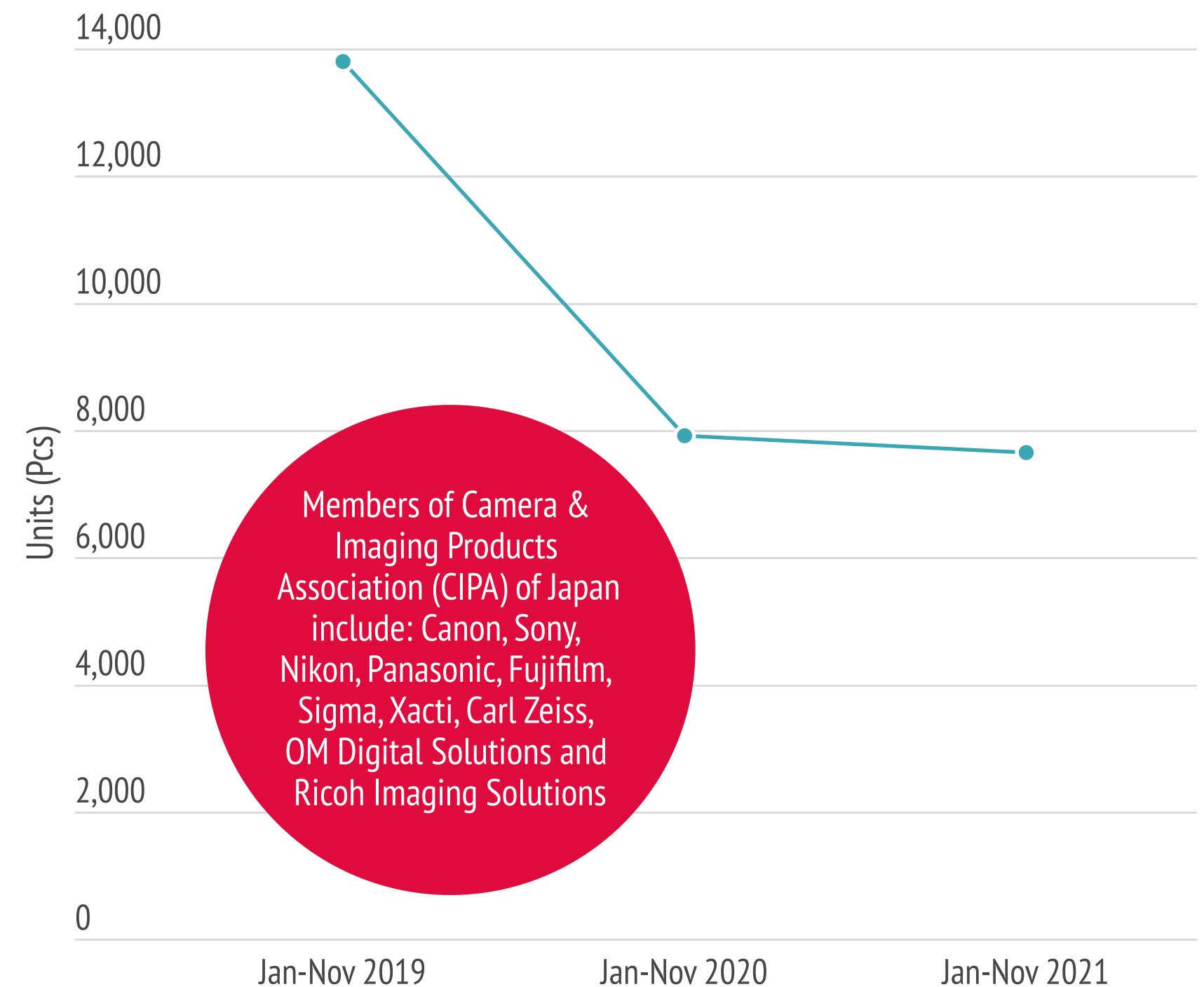
### Cameras Sales - Status quo:

Demand for cameras has significantly declined due to the COVID-19 pandemic, and the recovery of revenues remains slow due to the global shortage of semiconductors, causing a bottleneck in camera production.

IABM estimated that the average decline in camera sales in 2020 was between 30% and 35%. In 2021, the annual addressable market size (in units sold) was estimated to be 100 thousand units smaller compared to the previous year due to the global shortage of parts, according to Canon.

Despite the overall stagnation of camera production and sales, some camera categories such as interchangeable-lens models (e.g., full-frame mirrorless cameras) that are mainly sold to the professional market are driving revenue - thanks to streaming services investing in high-end original content.

### Total Production of Digital Still Cameras by Japanese Manufacturers (2019-2021)

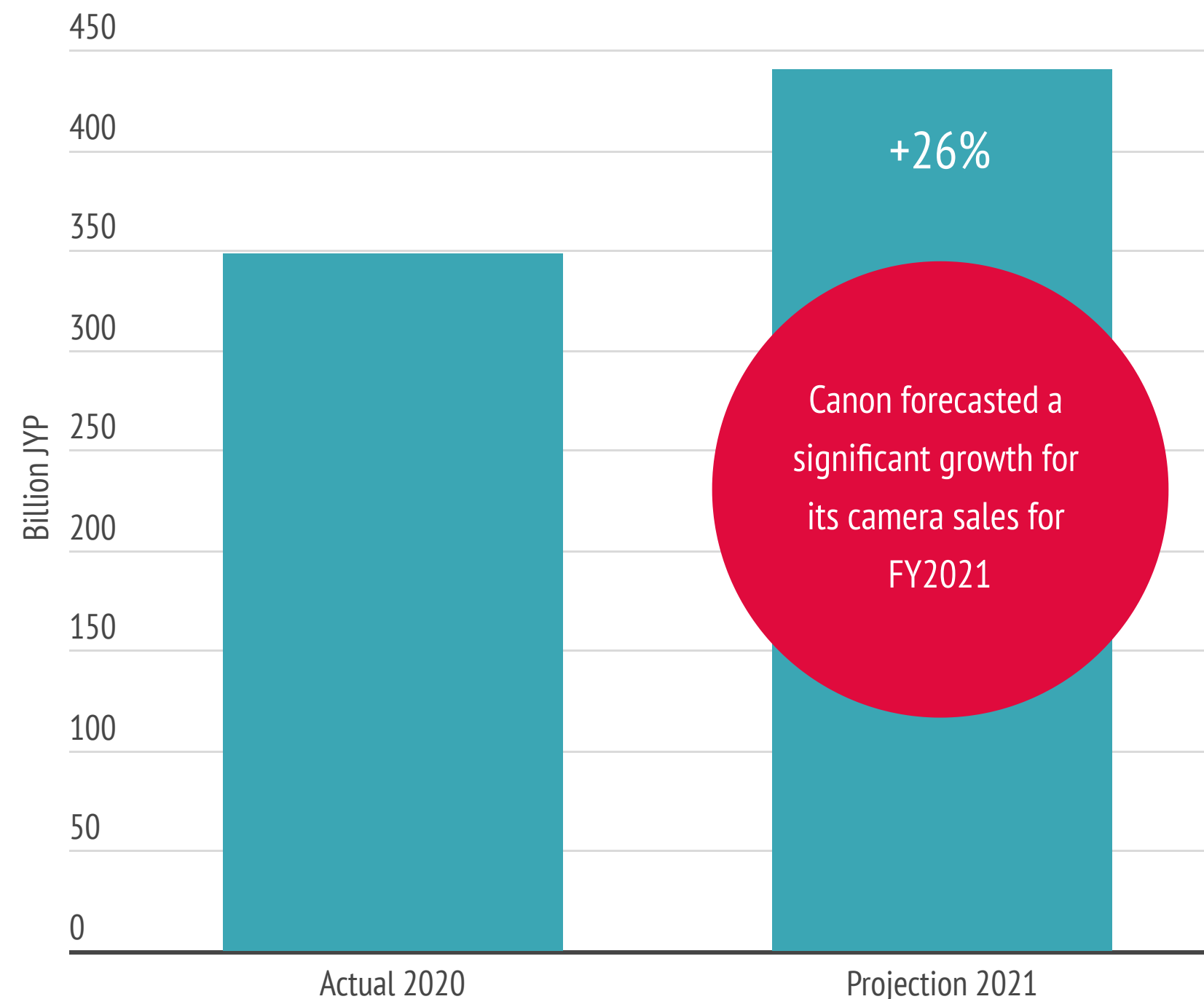


Sources: IABM, CIPA, Canon

# Content Creation Tech

## Cameras - Interchangeable-lens models driving revenue

Canon - Cameras' Net Sales, 2020-2021f



”

For **interchangeable-lens digital cameras**, unit sales were above those of the same period of the previous year in many regions due to strong sales of **EOS R5** and **EOS R6 full-frame mirrorless [cinema] cameras**. The camera market remained solid [in 2021] thanks to the strength of personal consumption, particularly in Europe and the United States, and the launch of new full-frame mirrorless cameras by each company that stimulated the need for **high-quality image expression**.

Canon Inc, Q3/2021 Financial Report

Sources: IABM, CanonNews.com, Company Filings

# Content Creation Tech

## Cameras - Interchangeable lenses upgraded to capture VR

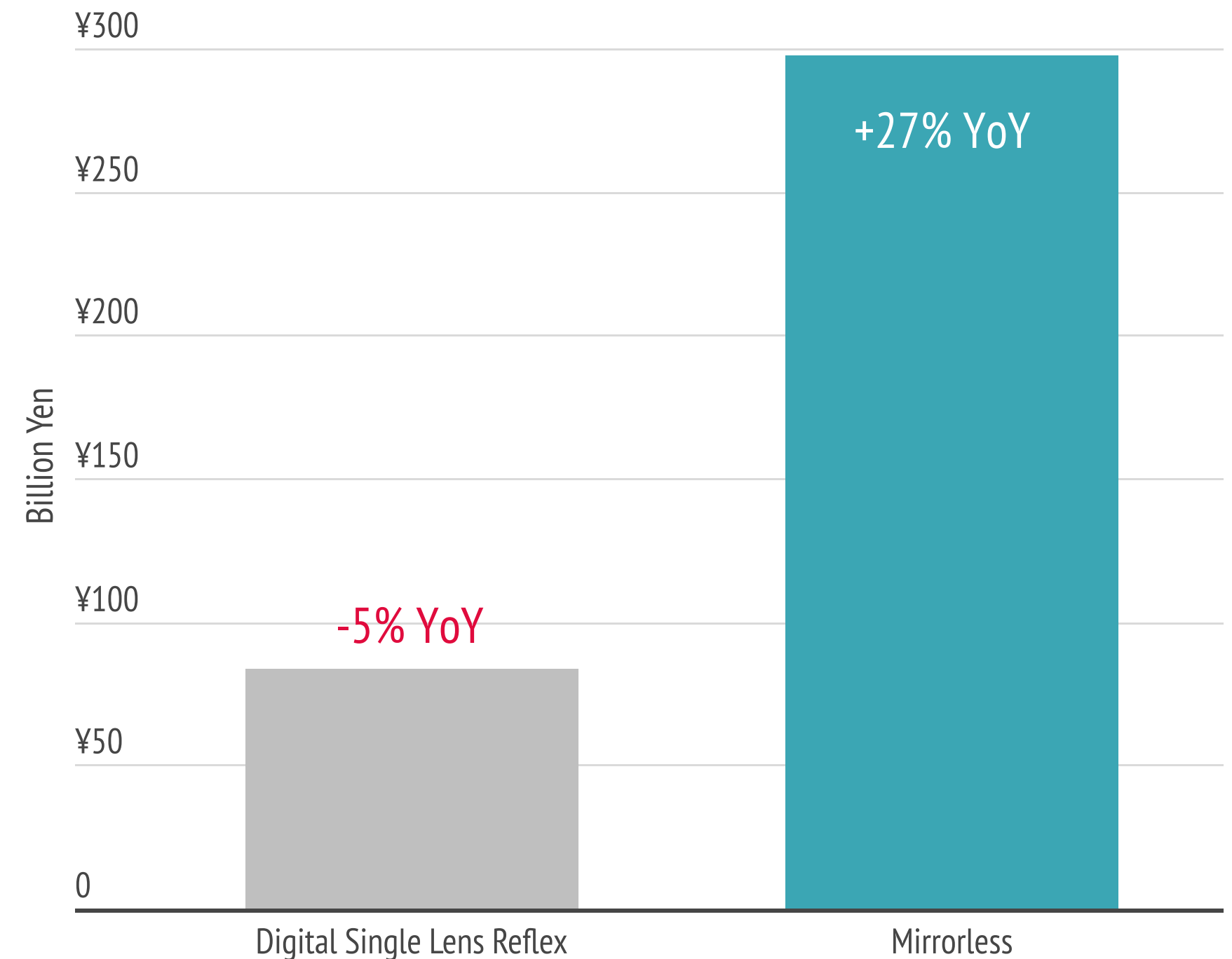
Many camera manufacturers like Canon are improving VR/AR capabilities of their full-frame mirrorless cinema cameras to meet increasing demand for high-quality image expression, driven by streaming and sports.

”

We plan to increase our lens line-up to 26 within this year, including the RF 5.2 mm F2.8 L DUAL FISHEYE lens that we announced this month, our **first lens designed specifically to capture VR images**. This lens, when mounted on an EOS R5 [mirrorless cinema camera], allows for the easy capture of **180 degree 3D VR images**, and is attracting attention as a product that extends the user's image expression to the area of VR.

Canon Q3/2021 Financial Report

Global Shipments of Interchangeable Lens Cameras by Model (Q3/2021, Japanese Manufacturers)



Sources: IABM, Company Filings, CIPA. Note: % growth refers to Jan-Nov 2021

# Content Creation Tech

## Cameras - Studio cameras



### Studio camera updates in News & Sports Broadcasting - Drivers

Studio camera updates are mainly driven by changes in **studio locations**, **facility fresh-ups** and new establishments of **network operations centers** (NOC), which were reactivated in 2021.

Increased need for **connectivity** - speeding up the **migration to ST 2110 IP environments** - is driving demand for studio camera upgrades and retrofits, where IP can be integrated on existing cameras by replacing the camera control unit (CCU).

Move to more **virtual studios** and **new production formats** requires upgrades to studio cameras, which must be able to do 1080p and 4K - to be flexible enough to work in any possible format upon request.

Shift to **remote production**, the increasing use of remote-controlled high-end box cameras for robotics and the adoption of 8x Supermotion among OB vans are also boosting demand for new studio cameras.

Sources: IABM, newscaststudio.com



# Content Creation Tech

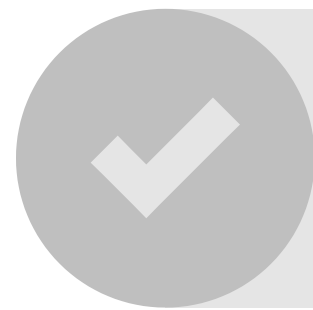
## Cameras - Studio cameras



### Studio camera updates in News & Sports Broadcasting - Move to IP



**Productivity:** Production resources will increasingly be shared across facilities, locations and teams



**Affordability:** Technology prices are expected to decrease along with an industrywide transition to full IP environments



**Interconnectivity:** Improved interconnectivity and interoperability between vendor solutions is facilitating investments in studio camera upgrades

”

The move towards **IP infrastructures**, combined with the increasing drive towards **flexible, decentralized** productions, will lead to greater flexibility in the **bandwidth requirements** of the cameras. While the available bandwidth of local IP networks typically allows uncompressed operation of the cameras, **data compression** will play an important role when wide area networks are used for an array of decentralized productions.

*Klaus Weber, Principal of Camera Solutions and Technology,  
Grass Valley*

Sources: IABM, newscaststudio.com, Grass Valley

# Content Creation Tech

## Cameras - Studio cameras

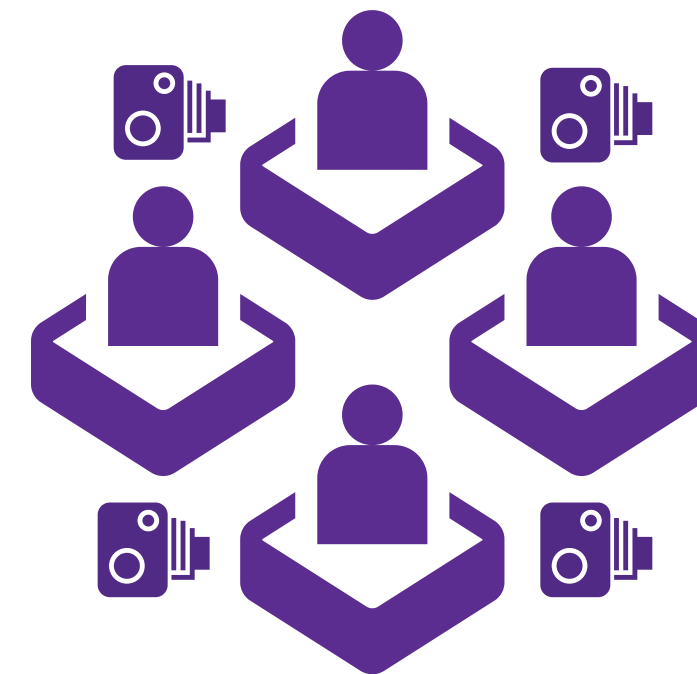


### Studio camera updates in News & Sports Broadcasting - Move to IP

#### News control room



#### Decentralized productions



► **Automation:** Transition to automated news operations

► **Robotic cameras:** Integration of studio cameras with robotic systems

► **Customizable camera control panels:** Better control and optimization of image quality - away from the camera control room - improving decentralized productions and communication

Sources: IABM, newscaststudio.com



# Content Creation Tech

## Cameras - Studio cameras

### Studio camera updates in News & Sports Broadcasting - Automation & Virtual studios



Despite the trend toward greater automation of studio cameras, the highest image quality can currently only be achieved by manual scene- and light-dependent camera control

”

In order to build a fully functional virtual studio, **automation** is a great driving force to the upgrade of studio cameras, which is fuelling a continuing trend of integrating studio cameras with **robotic systems**. The addition of **tracking systems to camera rigs** to incorporate elements like **AR** and **3D graphics** is moving into more markets to create new and more compelling content.

*Mike Bergeron, Senior Product Manager, Live Production,  
Panasonic USA*

Sources: IABM, newscaststudio.com

# Content Creation Tech

## Cameras - Studio cameras



### Studio camera updates in News & Sports Broadcasting - New Production Formats

HD

Nearly all TV stations have already upgraded to HD cameras in news studios

The use of full HD (1080p) will be further accelerated by the adoption of ATSC 3.0

Many cable and satellite channels and some streaming platforms still prefer an HD HDR option instead of UHD

4K UHD

News studios are increasingly adopting 4K and HDR to prepare for the future and to maximize ROI even without immediate plans to implement 4K

4K is particularly used on special sports channels via cable, satellite and streaming (e.g., mobile sports production). ATSC 3.0 will further accelerate the implementation of 4K/UHD

"For OB live events, 4K supports image magnification for large LED board and it's being implemented for archival purposes and streaming purchases" (Rob Willox, Media Solutions Marketing Director at Sony Electronics)

HDR

Demand for productions in each of the HDR formats depends on the transmission standards deployed, favoring flexible, native HDR solutions (i.e., solutions supporting all of the known HDR formats)

"The rate of adoption is very dependent on market conditions in different regions. We see customers producing in both 4K/UHD and the various HDR formats, or BT.2020 WCG - others are using only parts of these formats. For example production in 1080p with HDR and WCG is a typical application in some markets, while 4K/UHD in SDR is used in other markets." (Klaus Weber, Principal of Camera Solutions and Technology at Grass Valley)

Sources: IABM, newscaststudio.com



# Content Creation Tech

## Cameras - Studio cameras



### 3 in 1 camera by Blackmagic Design - Versatility

In November 2021, Blackmagic Design introduced its new "next generation" camera, the URSA Broadcast G2, targeted at both traditional broadcasters and online broadcasters. It's a 3 cameras in 1 design; it can be used as a **4K production camera**, a **4K studio camera** and a **6K digital film camera**. While it is compatible with all video software and broadcast MAM systems, the camera also includes full DaVinci Resolve Studio for post production. This saves resources and increases collaboration between creation and production teams.



Sources: IABM, blackmagicdesign.com

# Content Creation Tech

## Cameras - Small cameras for professional use

When it comes to small field cameras, recent advancements in technology have enabled manufacturers to miniaturize cameras to a degree that was not possible some years ago. Driven by home studios and remote production (techniques used in Esports), major TV and cinema productions are increasingly investing in smaller cameras offering more flexibility in camera placement - and thus offering new filming locations. By using smaller cameras productions can intercut with their high-end equipment and reduce costs.

Blackmagic's Pocket Cinema Camera featuring HDR and 4K/6K enables the user to create the same look as "Hollywood" feature films. The camera offers professional features that can be flexibly used to content creation ranging from films and TV programming to video blogs, YouTube content and social media.



Canon's ME200S-SH camera matches the footage compatibly in post-production with the Canon Cinema EOS line whether the footage is for TV, cinema or internet distribution. The camera can be used for drone work, vehicle mounting or discreet placement, and be monitored via remote SDI connectivity.



Source: IABM, phphotovideo.com, Blackmagic, Canon



# Content Creation Tech

## Cameras - Acquisitions strengthening remote production capabilities

*“The spread of COVID-19 has accelerated this [remote production] trend, and the need of **combining on-premises facility** and **cloud processing**, enabling **remote work** and resource sharing, has become the basis of business continuity planning for the broadcast and production community.”*

*“By embracing digital, **remote workflows** and **distribution**, VISTA has offered these [new sports leagues] customers innovative, cost-effective solutions that can **flex and expand** as their needs grow.”*

Sep  
2020

**SONY**  
Sony acquired Nevion.

Mar  
2021



NEP acquired VISTA Worldlink.

May  
2020



EVS acquired Axon.

Feb  
2021



Net Insight sold ScheduALL to Xytech Systems to focus on remote production.

*“The acquisition will enable EVS customers to implement turnkey solutions to smoothly migrate their infrastructure towards **IP** and **remote production-based workflows**.”*

*“The divestiture of ScheduALL reflects Net Insight’s strategy to focus on its core Media Networks business, where substantial progress has been made to capture **growth** opportunities across **cloud, IP and remote production** applications.”*

Source: Sony, EVS, NEP, Net Insight

# Content Creation Tech

## Camcoders - Cloud-based livestreaming for the creator economy

The content-led streaming boom fuelled by the pandemic has strengthened the "creator economy", which is increasingly using professional cameras and camcoders. Livestreaming religious services, university lectures and corporate meetings have also emerged as new, important verticals for camcoders.

The shift toward home studios and remote working have boosted demand for high-end (UHD) camcoders, which can be connected to the internet. Key players in the camcoder market - Canon, Panasonic, Sony, Samsung and Toshiba - have introduced models that can record and upload media to the cloud simultaneously. This has enabled the creator economy to expand its content to livestreams.



Canon Vixia HF G50 UHD 4K Camcorder



Sony HXR-NX80 4K NXCAM Camcorder

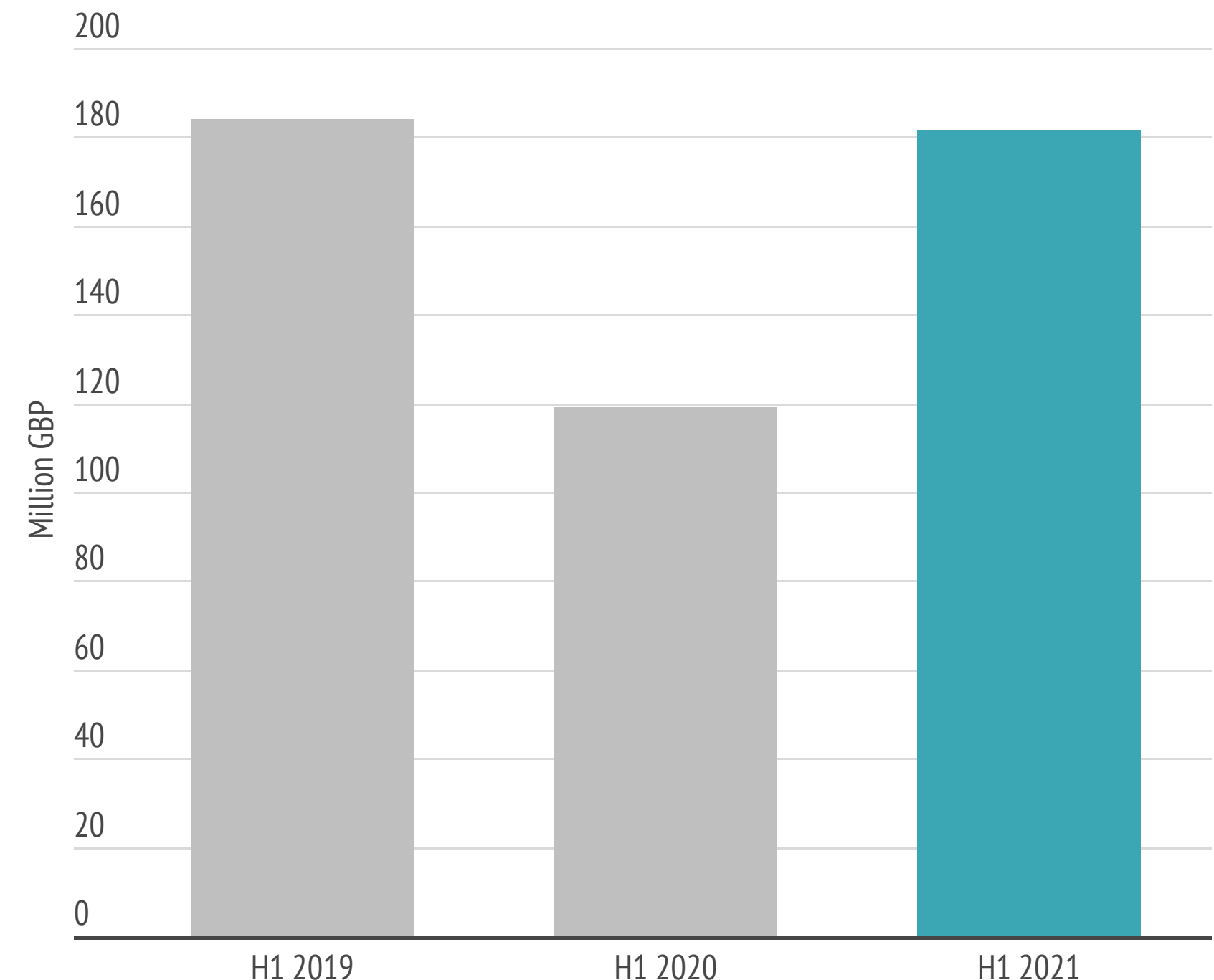
Sources: IABM, bhphotovideo.com, grandviewresearch.com

# Content Creation Tech

## Camera Accessories

Demand for camera accessories like tripods, batteries and lenses - being highly correlated with camera sales - recovered moderately in 2021 thanks to the production boom of scripted TV content. For example, the order intake at the Vitec Group, a major supplier of camera accessories and support systems, was estimated to be approximately 20% above 2019 (pre-pandemic) last year. To reduce their direct dependence on digital camera sales, manufacturers of camera accessories like Vitec Group are increasingly diversifying their investments in software-enabled technology to address new verticals like e-commerce, corporate and education sectors, which grew in importance during the pandemic.

Vitec Group's revenue in million GBP



Sources: IABM, Company Filings





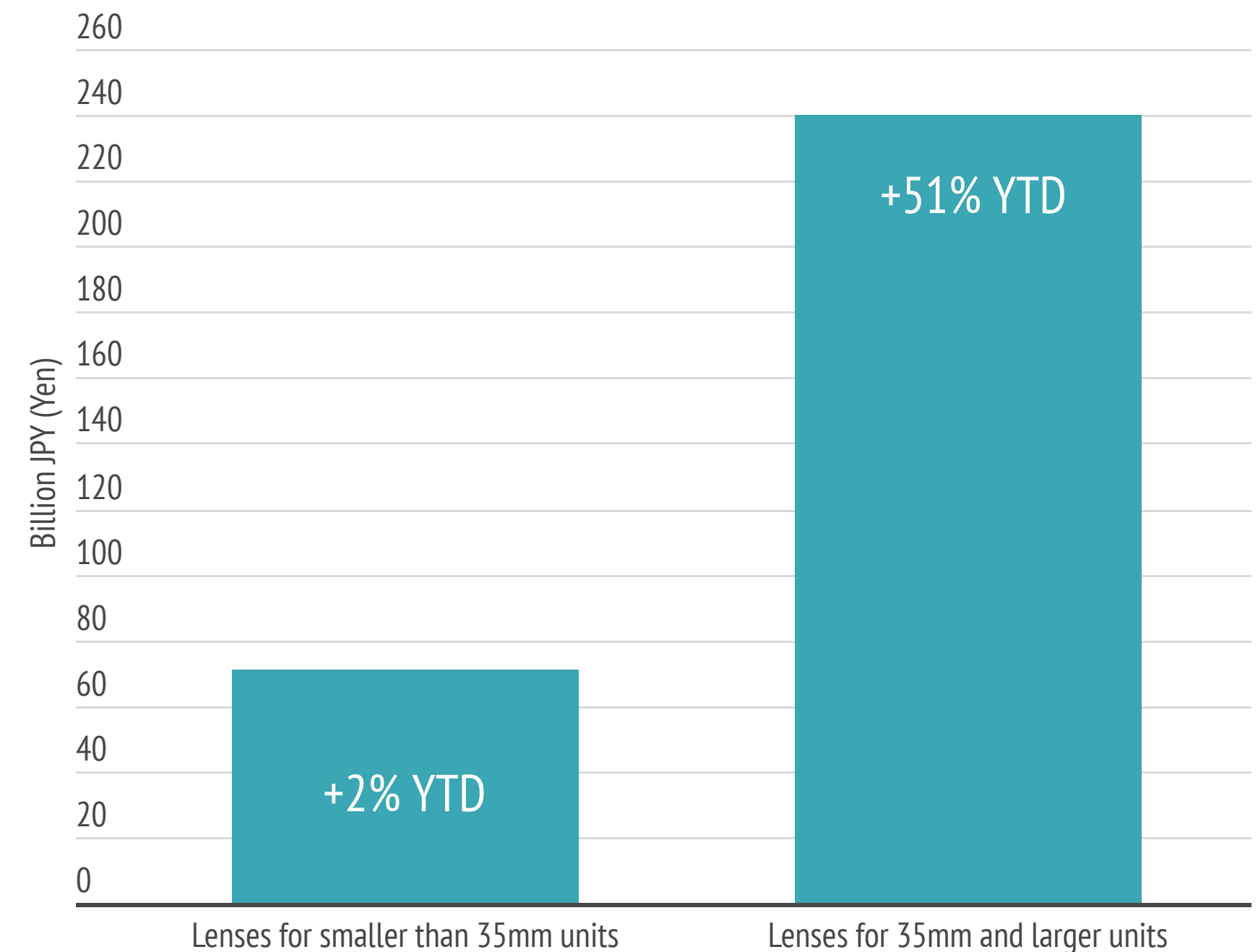
# Content Creation Tech

## Camera Accessories - Lenses

### Interchangeable lenses combined with mirrorless cameras driving revenue

The high demands of image quality - driven by the requests of big streaming players only accepting content shot in 4K - can currently only be met by using interchangeable camera lenses, which offer the camera user the freedom to depict a particular scene based on an exact, wanted artistic vision. Over the past 12 months, demand for bigger sized lenses (over 35mm) has increased significantly. Bigger lenses are technically better, because manufacturers can include more elements in designs to correct issues. Bigger lenses also capture more light and hence provide more alternative perspectives for the user.

Global shipments of lenses by Japanese manufacturers in Jan-Nov 2021



Sources: IABM, Company Filings, CIPA

# Content Creation Tech


## Lighting



Remote working during the pandemic incentivized manufacturers to develop lighting solutions for the professional remote working context as well as apps to control lighting. Global supply chain issues have resulted in the consolidation of lighting equipment providers, while the overall market demand for lighting equipment improved in 2021, thanks to the big investments in original content and streaming by media players.



The move to remote production is driving demand for remote control solutions that enable adjustments of lighting in real-time. Media companies are increasingly investing in wireless communication to lights, which allows them to test and create new scenes in temporary remote studios quickly compared to (time-consuming) fixed fixtures. Automated, moving lights are also becoming more common in broadcasting, offering flexibility.



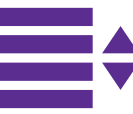
The pandemic accelerated demand for full-spectrum LED engines and LED lighting fixtures in broadcasting, as they improve lighting output and lifespan, while reducing heat and the risk of breakages. News studios are increasingly being equipped with LED boards, and displays behind the anchors, which enable a real-time change of background theme, lighting and atmosphere at the same time.

”

We did some test in co-operation with Danish broadcaster TV 2, Telia running lights over 5G. All the **lights** were **controlled over 5G** from several **remote spots in Europe**. This gets interesting when all the signal to and from are controlled over one stream of 5G.

***Peter Plesner, CEO and Founder of BB&S Lighting***

Sources: IABM, [encapsulite.co.uk](https://encapsulite.co.uk), [newscaststudio.com](https://newscaststudio.com)



# Content Creation Tech

## Microphones

In the professional microphone market, the COVID-19 pandemic has treated manufacturers differently; while some have had difficulties to satisfy explosive demand, others have experienced their business shrinking by over 90%. For instance, microphone sales to rental companies went dramatically down due to lockdowns, whereas manufacturers serving content producers and studios - purchasing studio and USB microphones - benefitted from the content creation boom, video blogging, game streaming and podcasting. The increasing need for convenience, flexibility and mobility is driving demand for wireless microphones. Moreover, demand for technologies to source content for social media is increasing as media companies try to increase viewer engagement.

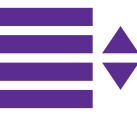
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COVID-19 has started the trend of remote working and learning from home that has benefitted the sales of our professional audio equipment, with a particular surge in orders of **wireless microphones**.

*FY2020/21 Interim Results Announcement,  
SUGA International Holdings (Hong Kong)*



Sources: IABM, Company Filings, SweetWater, ravepubs.com



# Content Production Tech



# Content Production Tech

## Real-Time Production

Demand for content production equipment was hit hard by the COVID-19 pandemic in 2020, but thanks to the segment's greater reliance on software and cloud-based solutions, related demand and revenues have recovered relatively fast, though depending on the product category.

### COVID-19 Impact



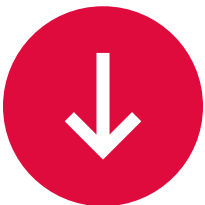
Graphics

Increasing demand for <b>interactivity</b> on social and video platforms	Increasing <b>convergence</b> between (sports) <b>streaming, gaming</b> and <b>betting</b>	Increasing demand for <b>real-time motion graphics</b> for AR, virtual studios, sports/news
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Video

Increasing use of <b>automation</b> in production, supporting <b>crew consolidation</b>	Shift to <b>remote production</b> facilitated by production over <b>IP networks</b>	Increasing demand for <b>Integrated Production Systems (IPS)</b> democratizing the live production market
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Audio

Innovation around <b>immersive audio content</b> gradually returning to pre-COVID levels	Shift toward <b>audio automation</b> , increasingly powered by AI/ML	Adoption of <b>voice-activated control</b> of multiple microphones enabling automation of video-follow-audio
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Sources: IABM, newscaststudio.com, tvtechnology.com



# Content Production Tech

## Real-time Production - Graphics in Sports

**Virtual Placement:** Flexible placement of more visually appealing on-screen graphics integrated into the sports field or audience stands (e.g., virtual advertising, sponsor logos) is growing in popularity. Virtual placement also enables seamless integration of complementary, rotating visuals of live play - optimized for either broadcast or OTT delivery - enriching the fan experience.

**Augmented/Added Reality (AR):** Sports broadcasters are increasingly using AR enhancements in live feeds to improve interactivity and to engage with their fans. Popular types of AR enhancements used in sports include comparisons between players and deeper stats. In-stadium experiences leveraging AR cloud and 5G technology are now being tested thanks to the increasing number of fans using 5G-enabled smartphones.



Sources: IABM, Behance, live-production.tv, Poplar.Studio



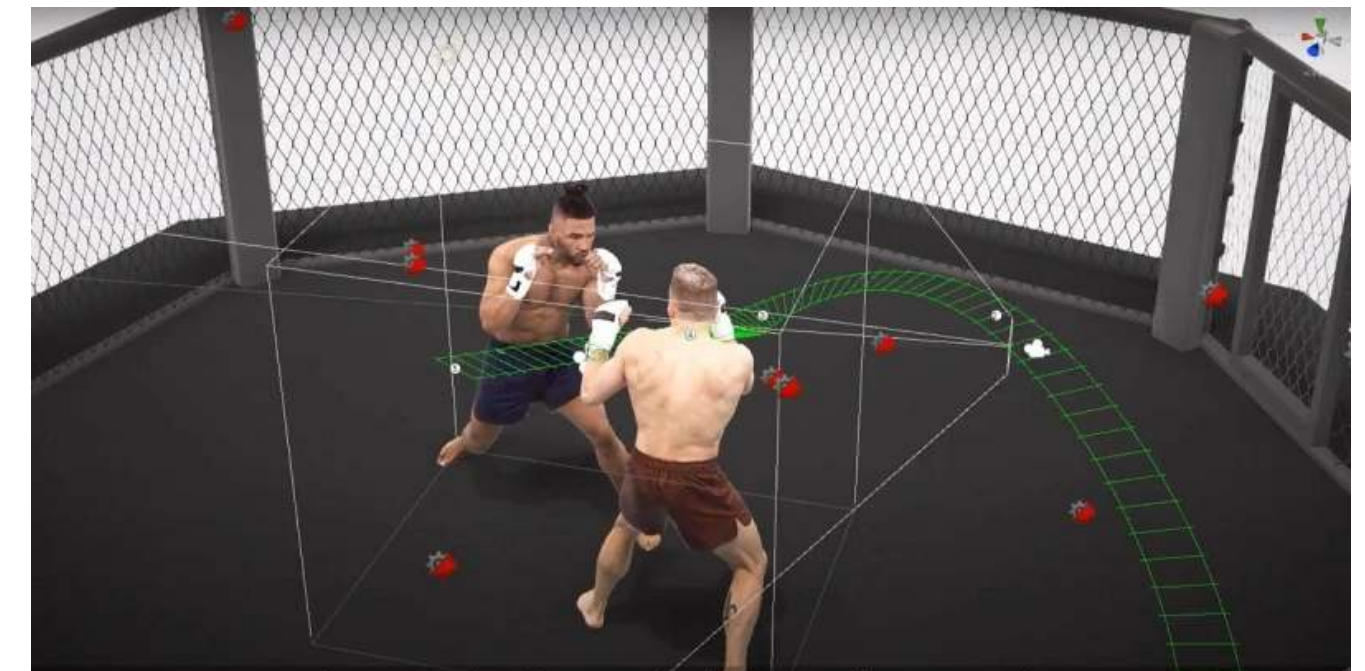
# Content Production Tech

## Real-time Production - Graphics in Sports

The COVID-19 pandemic accelerated interest in hybrid events - simultaneous in-stadium and living room experiences - enhanced with AR, VR and mixed reality. Now several tech companies producing real-time graphics are working toward the metaverse - and shared virtual experiences in sports.

In April 2021, Epic Games - known as the publisher of Fortnite - announced having received US\$1 billion from a range of investors including Sony. Tim Sweeney, Founder of Epic Games said: "[The investment] will help accelerate our work around building connected social experiences and support our vision from Epic and the metaverse."

Unity - having its roots in mobile gaming - is running a platform for creating and operating real-time 3D content is developing a sports-focused metaverse. Its real-time 3D platform, Metacast, builds fully interactive images by using volumetric capture, which can also directly incorporate ecommerce - a viewer can enjoy a basketball game and choose to purchase a pair of sneakers within the platform during the match. In December 2021, Unity acquired Weta Digital, an interoperable real-time 3D (RTSD) art creation platform.

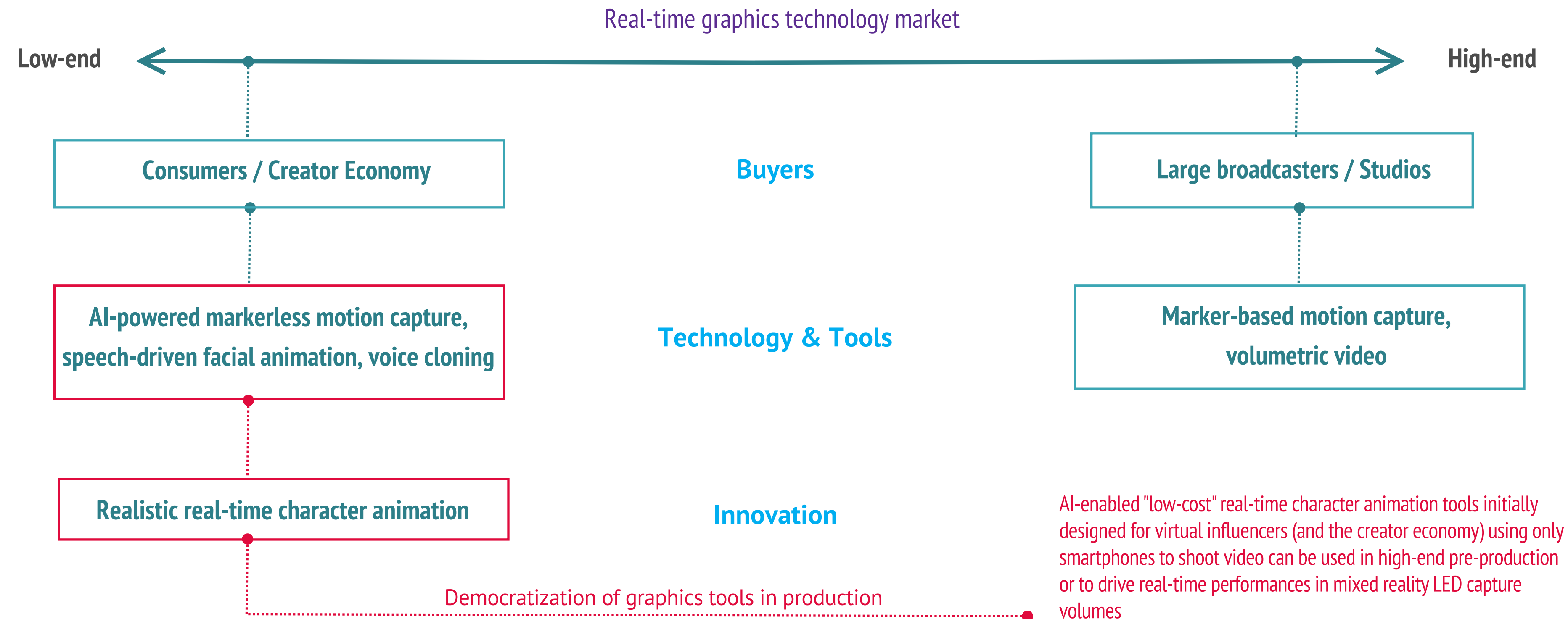


Sources: IABM, Unity, Intel Laser Wall, sportsmedia.com

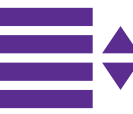


# Content Production Tech

## Real-time Production - Graphics in Animation



Sources: IABM



# Content Production Tech

## Real-time Production - Graphics & Omniverse

NVIDIA Omniverse is a multi-GPU (Graphics Processing Unit) real-time reference development platform for 3D simulation and design collaboration, which is based on Pixar's Universal Scene Description (USD) standard and NVIDIA's RTX (ray tracing) technology

In January 2022, NVIDIA launched a free version of its Omniverse platform enabling millions of creators to develop and connect their 3D virtual worlds. Currently used by nearly 100,000 creators, Omniverse provides rendering, physics and AI technologies to facilitate and speed up their workflows



As an interactive, immersive and collaborative virtual 3D platform, Omniverse represents a sub-universe, which the metaverse will aggregate under its umbrella

”

We imagine engineers, designers and even autonomous machines connecting to Omniverse to create digital twins and industrial metaverses.


*Jensen Huang, CEO at NVIDIA*

Sources: IABM, Forbes, [blogs.nvidia.com](https://blogs.nvidia.com), [globelivemedia.com](https://globelivemedia.com), [time.news](https://time.news), NVIDIA




# Content Production Tech


## Real-time Production - Graphics & Augmented Reality (AR)



**Photorealism:** The line between real and computer-generated content is blurring and the role of graphic designers is growing in importance as creating high-quality AR requires investments in the right skillsets.



**Gamification of reality:** Game engines such as Unreal Engine have brought significant advancements in computing render power, enabling the production of very realistic lighting and shading as well as virtual interactive elements in real-time.



**Convergence of technologies:** Combining different technologies (e.g., LED with projection mapping, camera tracking and motion capture in real-time) allows the production of completely 'next level' of visuals and virtual experiences.

”

When we begin to **mix** chromakeying, augmented graphics, LED screens to create depth monitoring (extended reality) and couple that with **interactivity** for the audience via the digital platforms and the hosts of a broadcast in studio we are witnessing the **gamification of reality**.

*Nathan Marsh, Managing Director at Girraphic*



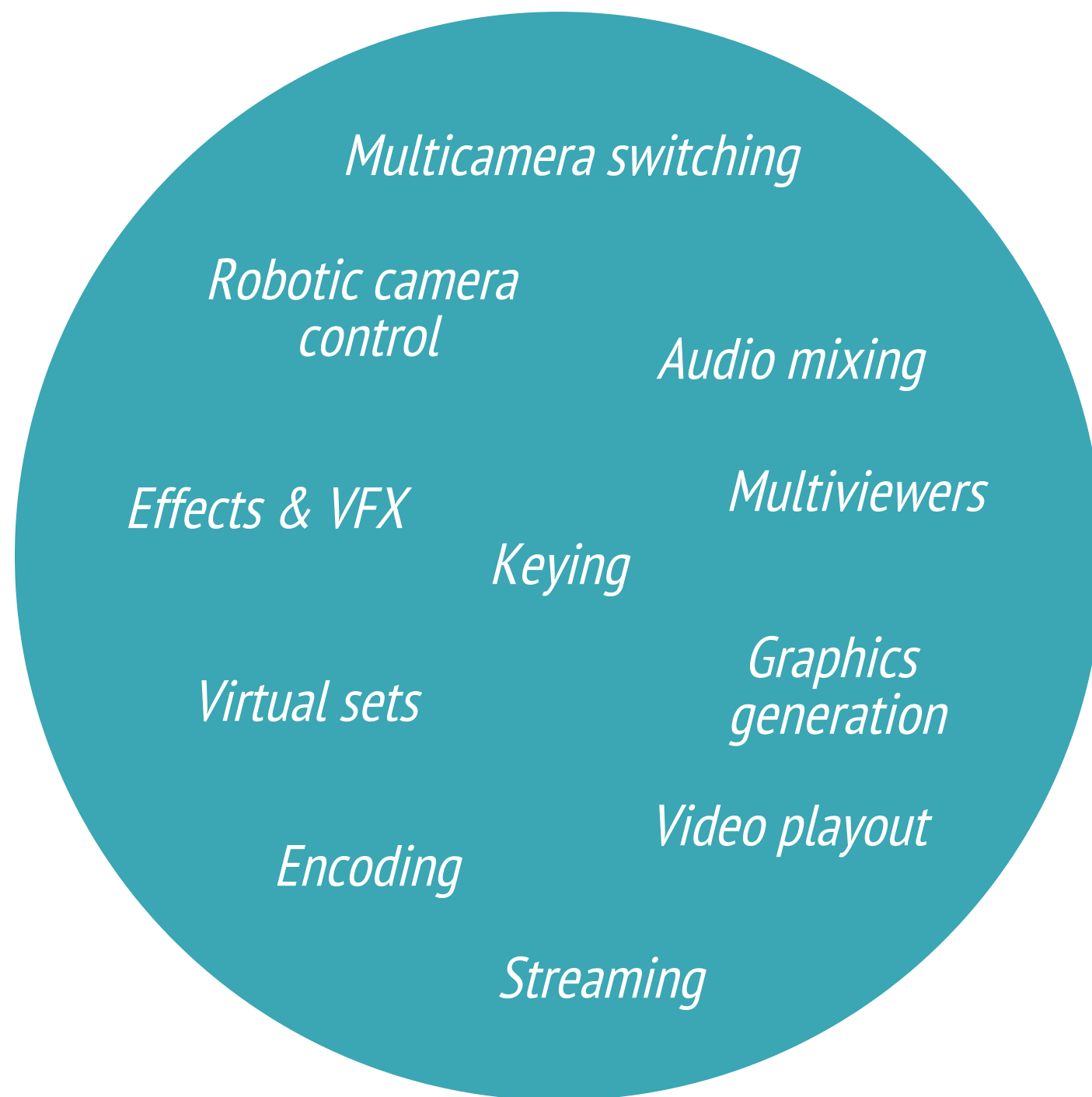
Sources: IABM, Unreal Engine, newscaststudio.com, IBC365

# Content Production Tech

## Real-time Production - Integrated Production Systems (IPS)



### *Integrated Production Systems (IPS) - Substitute for a Control Room*



**Democratization of multicamera HD production:** Integrated production systems enable affordable, compact one-person live production operations for individual content producers (e.g. creator economy).

**Third-party tech integration:** The increasing use of NDI (Network Device Interface) makes any NDI-enabled device recognize each other in the same network and creates interoperability between third-party systems.

**Cost savings via remote control over IP:** Labor and operational cost pressures are pushing high-end video productions toward software-based IPS and remote control (by using a tablet) over IP/wireless networks.

Sources: IABM, tvtechnology.com



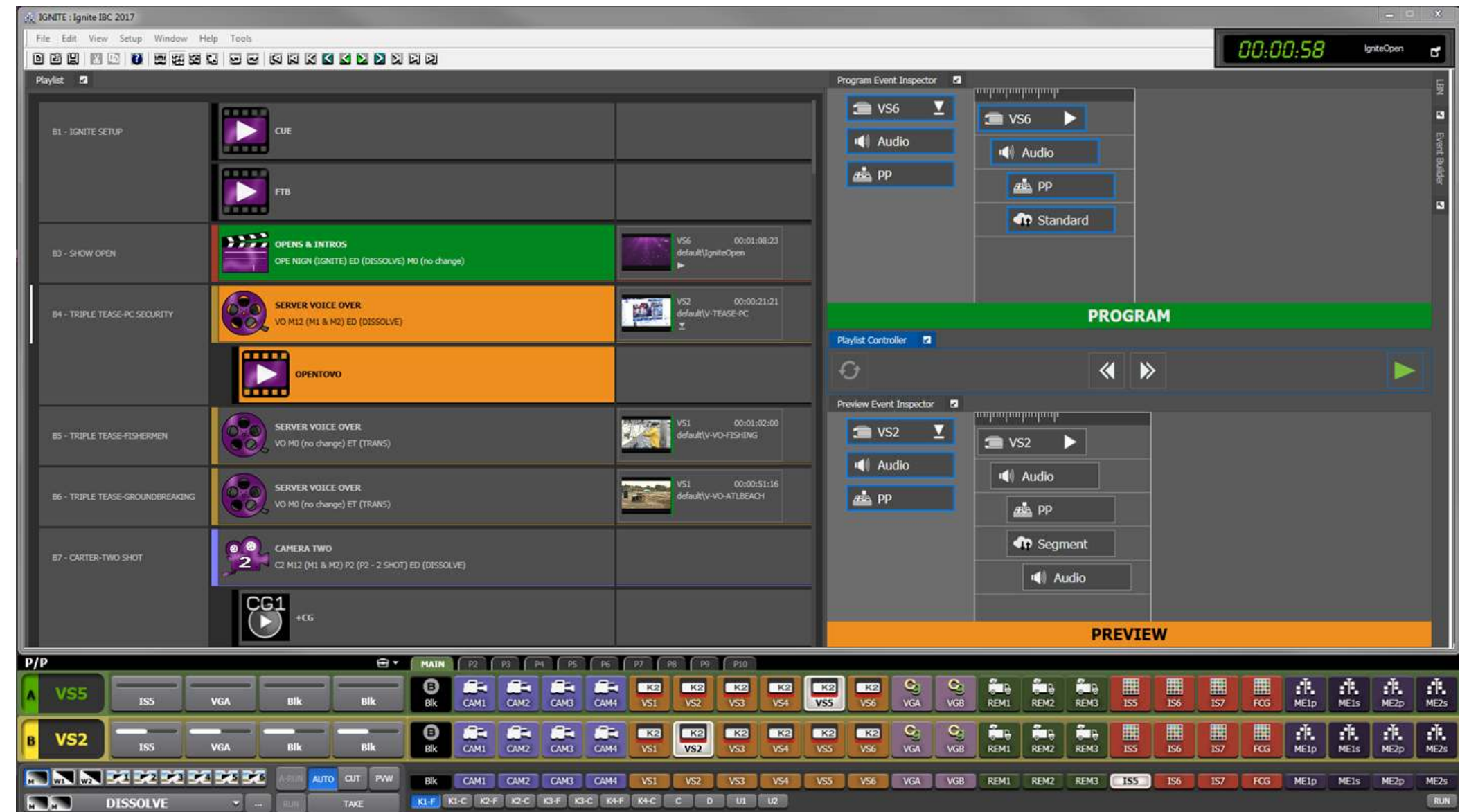
# Content Production Tech

## Real-time Production - Integrated Production Systems (IPS)



### *Software-based IPS for Multiplatform Delivery by Grass Valley*

As the trend toward crew consolidation and remote production continues, software-based integrated production systems combining several functionalities of a traditional control room are becoming increasingly popular, enabling a single operator to manage all devices for live news broadcasting and event programming. Grass Valley Ignite - a software-based IPS - combined with Grass Valley's Stratus Digital Media Platform (DMP) enables broadcasters to automate integrated production workflows and the delivery across multiple platforms like TV, internet and mobile. The combined solution also automates the preparation of complex, ad-supported content for multiplatform delivery, saving time and resources.



Sources: IABM, Grass Valley, tvtechnology.com



# Content Production Tech

## Real-time Production - Audio Automation & Production

**Automation** in audio production has been significantly **slower** than in video production, and several parts of audio production workflows such as broadcast mixing still remain a relatively manual process. Now, big streaming players - driving the production of immersive content - are investing in automated audio solutions.

Adoption of **digital connectivity standards** like AES67, SMPTE ST 2110 and NDI is driving the implementation of **smart software solutions** - using AI and intelligent DSP - in live (sports) broadcast audio, which can mimic and then automate the mixing decisions of an audio engineer.

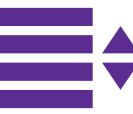
**Immersive audio** related innovation is bouncing back to pre-COVID levels thanks to the arrival of immersive audio content on certain consumer services like Apple Music as well as consumers' growing installed base of high-end sound bars priced below US\$1,000 and binaural headphones at home.

”

If the **OTT players** keep driving the production of **immersive content**, and the increasing affordability of convenient playback devices like sound bars continues, then there's no doubt that more and more consumers will simply see it as the new standard. **Apple Music's** adoption of **spatial audio** is another important milestone on the road to wider **consumer awareness**, so we'd cautiously say that the signs seem pretty positive right now.

*Howard Jones, PR Director at Genelec*

Sources: IABM, SVG Europe, IBC365



# Content Production Tech

## Manage Production - Production Asset Management (PAM)

The COVID-19 pandemic pushed media businesses to improve and enhance their remote production and remote working capabilities, driving investments in connectivity, automation, and collaboration tools. This has increased demand for production asset management (PAM) solutions, supporting crew consolidation.

Several broadcasters have reduced the number of operational staff in live studios and made them work remotely with collaborative remote systems. This has driven sales for PAM systems, allowing editors and (post-) production teams to discover, manage and track media files throughout the production process - together.

Demand for MAM solutions has also increased due to media businesses' accelerated move to the cloud during the pandemic. Because they provide all features of a PAM system and can manage more media types than PAMs, many broadcasters directly choose a MAM solution despite its higher cost.

*Adobe Acquires Frame.io PAM Platform Provider (08/2021)*

”

We've entered a new era of **connected creativity** that is **deeply collaborative**, and we imagine a world where everyone can participate in the creative process. With this acquisition, we're welcoming an incredible customer-oriented team and adding Frame.io's **cloud-native** workflow capabilities to make the creative process more **collaborative, productive, and efficient** to further unleash creativity for all.

*Scott Belsky, CPO & EVP, Adobe Creative Cloud*

Sources: IABM, IBC365, NewscastStudio, ear.net, live-production.tv, Adobe



# Content Production Tech

## Post-Production



**Move to the cloud:** The COVID-19 pandemic significantly accelerated media businesses' move to the cloud, allowing greater collaboration, remote work for post-production teams, and also gained access to an infinite pool of freelancer resources and a wide range of cloud-based post-production tools.

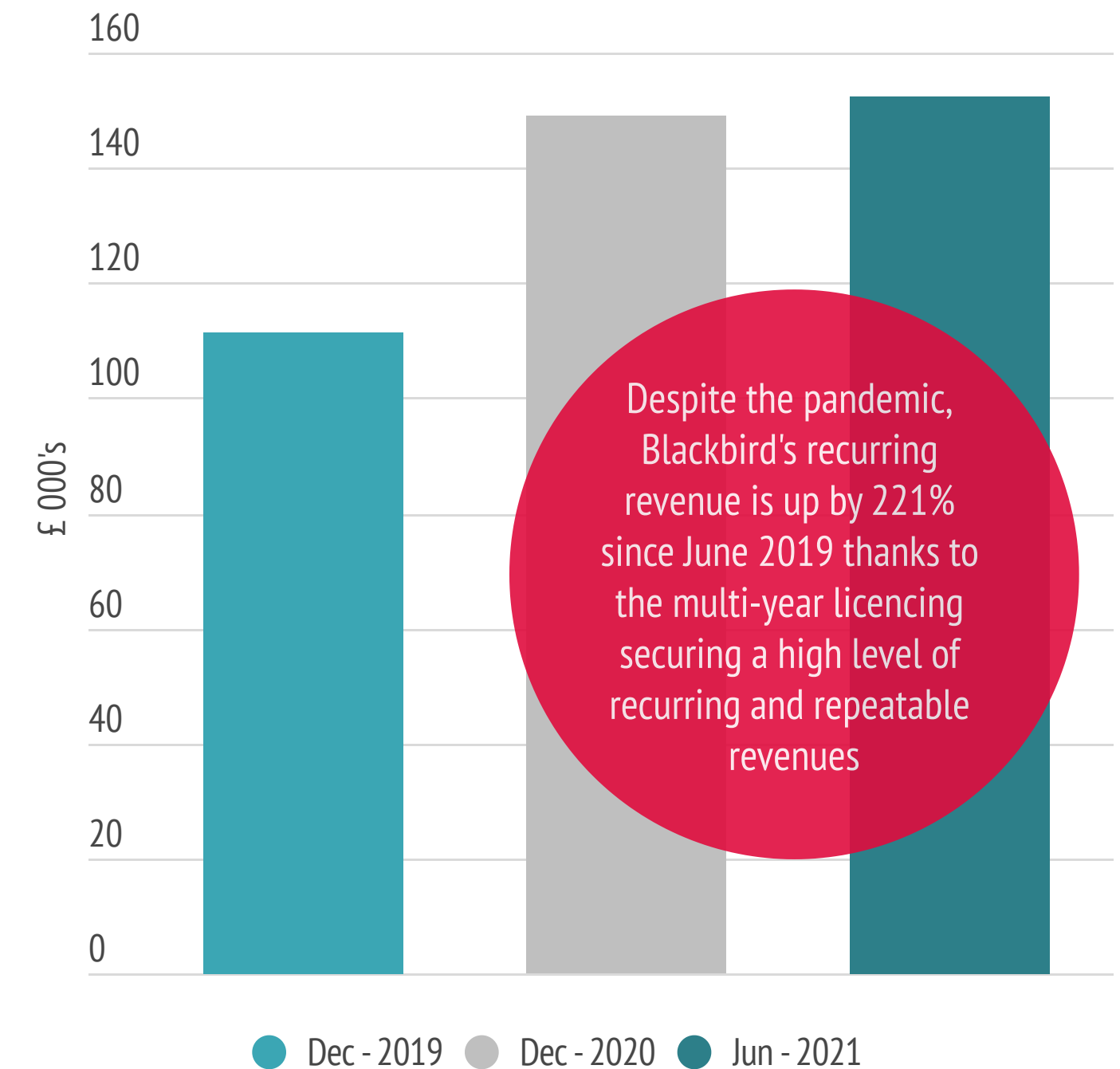


**New monetization opportunities:** Move to the cloud has allowed new monetization models for both tech buyers and sellers. For example, Blackbird - offering cloud-based post-production platform services - owns its own player, which is used in its core video editing product recording a huge amount of data that brings Blackbird new monetization possibilities.

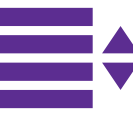


**Creator economy:** The explosive growth of the "creator economy" consisting of independent, self-employed creators has benefitted companies like Blackbird, whose cloud-based post-production solutions have improved their efficiency in video creation and distribution.

*Blackbird - Recurring revenue 2019-2021*



Sources: IABM, Company Filings

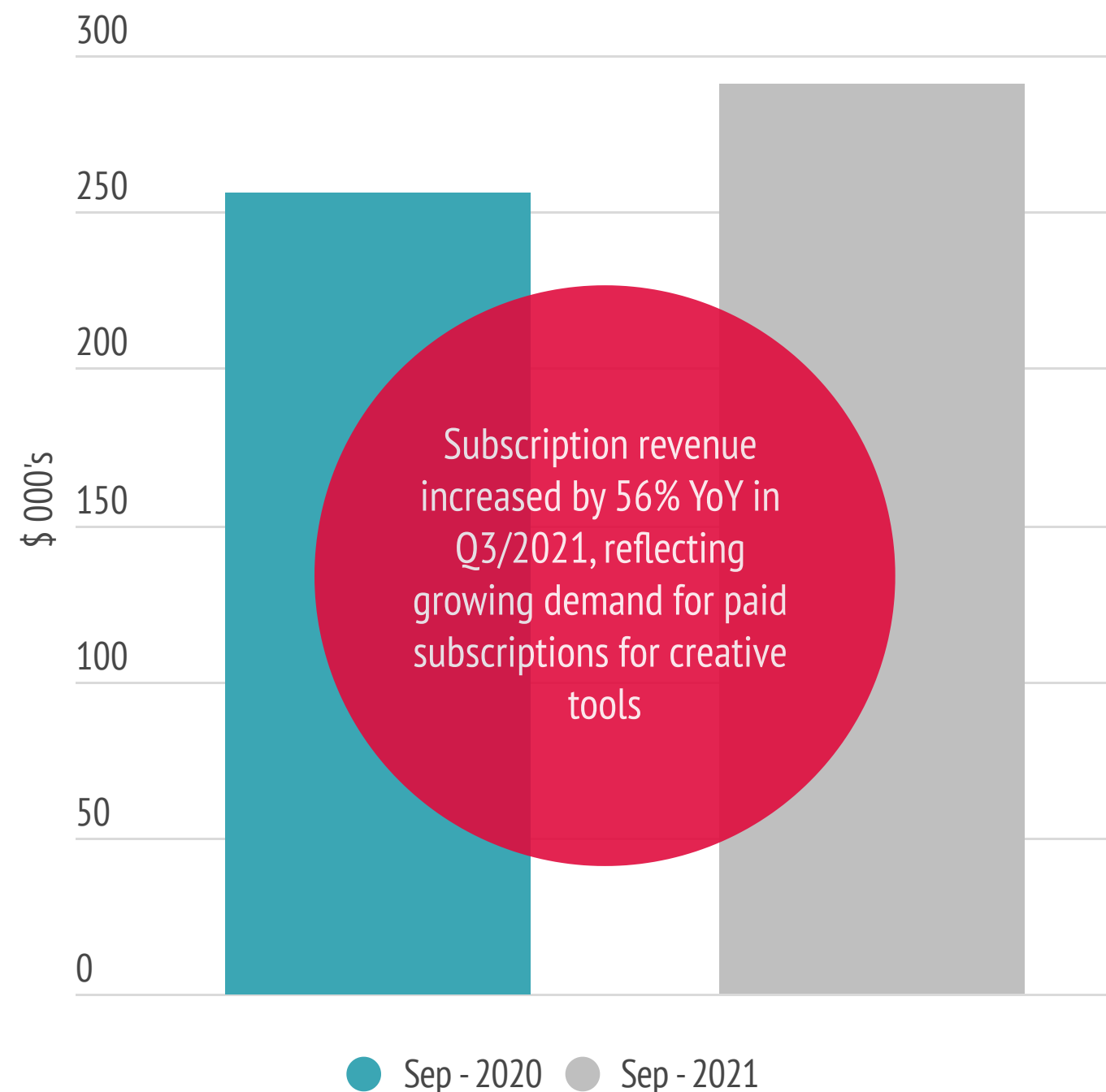


# Content Production Tech

## Post-Production - Cloud

*Avid - Q3/2021 Earnings Call*

*Avid - Total net revenue*



### Trend 1: Growth of subscription business

"We saw strong growth in our overall **subscription business** in Q3/2021, including solid performance across our creative tools and strong enterprise subscription sales. We signed several **multiyear enterprise subscription agreements** in the quarter with large media companies around the world, including with the BBC. Our **creative tools** continue to be in a **central piece of our subscription growth**."

### Trend 2: Rise of the creative economy

"Specifically with regard to Pro Tools, we saw an **acceleration in net adds from creative individuals** in the third quarter, and we like the direction we're seeing so far. Our channel partners also sell to all levels of customers: large enterprises, small- and medium-sized businesses and **individual creatives** or **creative teams**. And we're seeing that success and **growth** across all those segments."

Sources: IABM, Company Filings

# Content Production Tech

## Post-Production - Cloud

The move to the cloud has enabled post-productions teams to collaborate faster and create new remote ways of working, which will likely become permanent after the pandemic, as the industry moves toward crew consolidation and decentralized productions.

”

We are **remote** and **cloud first**—everything we design is with that in mind. That doesn't mean we won't have own infrastructure or premises but the starting point is to make it work in a **decentralised** way and open up opportunities for **remote collaboration**. It would have been challenging to do this five years ago but the technology has now reached a **tipping point**.

*Graham Jack, CTO, BeloFX (VFX startup)*



*Remote post production at The Farm, a UK-based independent post house*

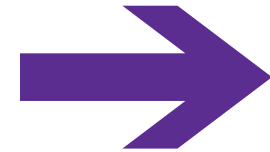
Sources: IABM, IBC365

# Content Production Tech

## Post-Production - AI/ML



### *AI/ML in Post-Production*



### *AI/ML Automating Tasks - Examples*

#### **Editing**

AI/ML tagging shots with metadata automatically, organizing and analyzing all project clips, indexing audible dialog, synchronizing each source clip to its associated line in a movie or a script.

#### **Captioning**

AI-based speech-to-text and auto-captioning solutions generate a video transcript and captions automatically and then match them to the video timecode involved.

#### **Enhancements**

AI/ML can do colour grading by taking examples from a reference shot, then applying them across the entire edit across different cameras.

#### **Audio**

AI/ML is used to remove real obstacles such as wind noise from microphones and is emerging in assisted mastering, mixing and composition.

**Cloud AI/ML services:** Integration of post-production tools like Avid Media Composer and EditShare's EFS with cloud AI/ML services from providers like Amazon and MediaCentral is boosting automation in post-production. Financial pressure and need for efficiency, productivity and crew consolidation increased demand for AI-based post-production tools in 2021.

Sources: IABM, prosoundnetwork.com, redsharknews.com, digital-nirvana.com



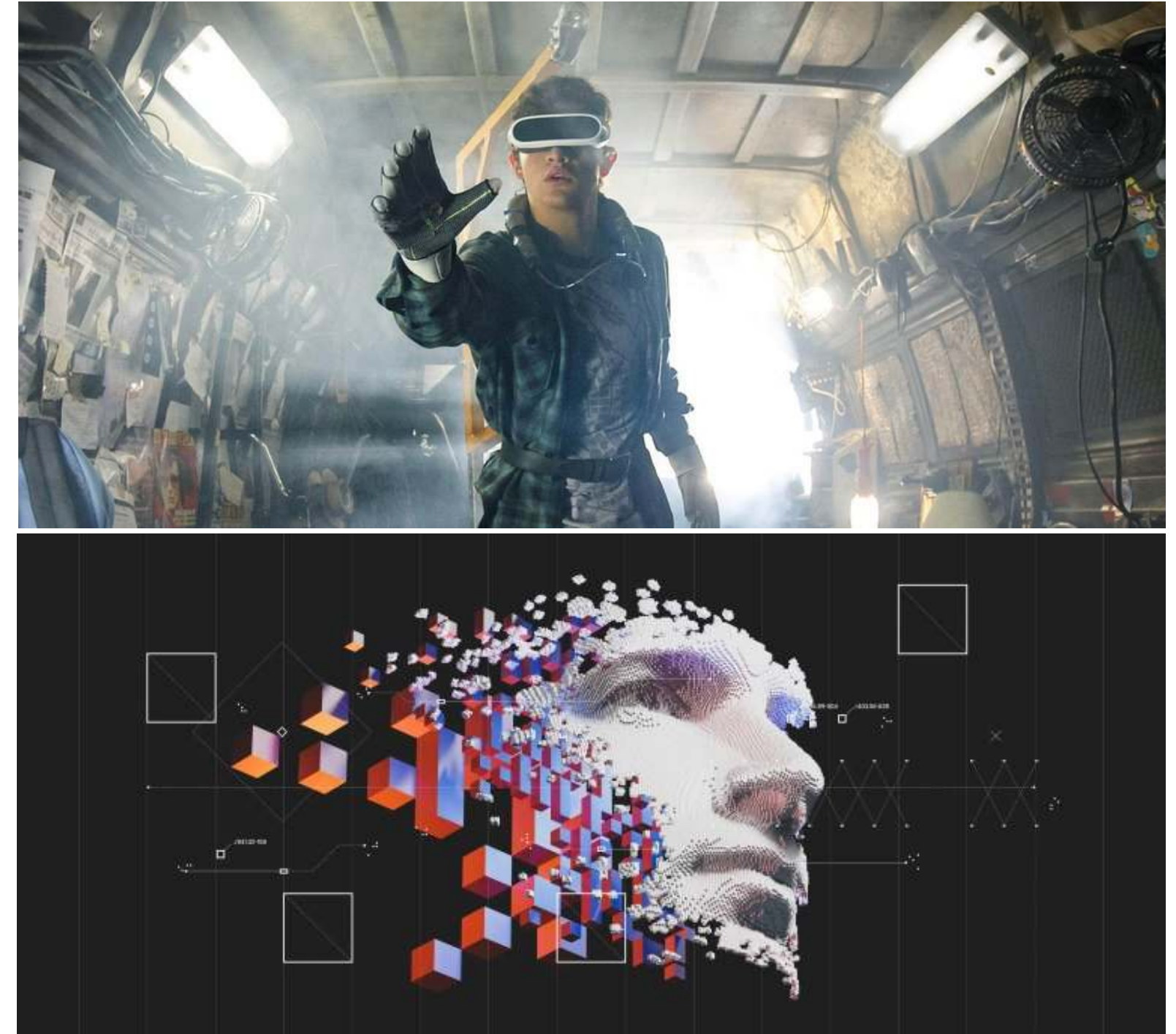
# Content Production Tech

## Post-Production - AI/ML



### *AI-based post-production platform for movies, games and the metaverse*

In January 2022, a US-based start-up Wonder Dynamics - backed by companies such as Epic Games and Samsung - introduced an AI-powered post-production/VFX tool targeted at filmmakers, game producers, social media influencers and the metaverse. Utilizing cloud and AI technologies, the Wonder Dynamics platform "complements" skills of content creators who lack technical skills in the fields of computer graphics (CG) and visual effects (VFX). Hence, the new tool is addressing the needs of the growing creator economy, consisting of individual video-makers, influencers and creative teams with limited budgets and experience. At the same time, the Wonder Dynamics platform is appealing for professional artists, as it can significantly reduce the amount of hardware, equipment and resources required for high-end content production. In terms of interactivity, the tool enables viewers to engage in AI-generated conversations with characters in a film as well as be part of a character's emotions.



Sources: IABM, clinicaltrialsarena.com, verdict.co.uk, wonderdynamics.com, techcrunch.com



# Conclusions

## Horizon for Create and Produce

Despite the global supply chain shortage causing a bottleneck for technology vendors' production and revenues, increasing investment in high-quality originals, image expression and interactivity are keeping the overall outlook for Create & Produce positive. The explosive growth of the "creator economy" is also offering new business opportunities for tech vendors, many of whom have already responded to the increasing need for smaller, lighter, cheaper and connected cameras - used by individual videomakers - by launching products to this new vertical. Media businesses' move to the cloud and IP-based workflows - a trend significantly accelerated by the COVID-19 pandemic - has facilitated companies to do more remote production, supporting their aims to permanently consolidate crews, decentralize productions and control costs with integrated production systems (IPS) combining a wide range of functionalities of a control room and allowing only one person to control all operations. Collaboration remains a key investment driver for media companies, who are prepared to continue remote working even after the pandemic. Cloud-based and AI-enriched post-production solutions play a key role in bringing media companies and a massive pool of creative freelancers together. Gamification of content creation is making immersive AR and VR enhancements an increasingly important part of sports productions, pushing media companies to prepare for the next visual reality - the metaverse.

Sources: IABM